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THE HISTORY
OF SMALL-POX
IN AUSTRALIA

1788-1908



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COMMONWEALTH OF AUSTRALIA.

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THE HISTORY OF SMALL-POX IN
AUSTRALIA, 1788-1908

Compiled from various sources by

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PREFACE.

In the compilation of the historical notes contained in the following pages, very much interesting material has been collected. The greater part of this has been obtained from official reports and from contemporary medical journals. It is not unlikely that had access to the official records in the various State Departments concerned been possible, a greater amount of information would have been obtained, but the opportunity for access to official records was not available, and, accordingly, the facts contained in this history are largely confined to those facts which have been made public. Notwithstanding this, however, a very great deal of assistance has been given by many public officials and many private collectors of Australian documents, and the assistance is here very gratefully acknowledged.

It is not presumed that the facts are complete or the deductions final. It may be that some of the facts or deductions are wrong, but if they serve to provoke the discovery of other facts, or discussion of hypotheses, then the most that is expected of this volume will have been accomplished.

J.H.L.C.

14th October, 1914.

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CHAPTER I.

SMALL-POX AMONGST THE ABORIGINES OF AUSTRALIA.

The settlement of Australia was very definitely inaugurated by the arrival of the First Fleet on 26th January, 1788, and historical records date from that occasion. These records are fairly complete, and it is safe to assume that no event of importance escaped being recorded. It is clear from these that small-pox has attacked the aborigines of Australia on one or more occasions. The evidence in respect of the occurrence of small-pox among the aborigines was first collected and reviewed by Mullins in 1897, later by Tidswell in 1898, and has very recently been again and more extensively collected and described by Cleland, 1912. Both the latter papers are printed as an appendix to this volume, and, in addition, there are added some other extracts which have come under the notice of the present writer. From a consideration of the evidence it is abundantly clear that there was a very extensive epidemic of small-pox among the aborigines, which first came under the notice of Europeans in April, 1789. Beyond the facts that this disease was attended with a very high rate of mortality, that it attacked a coloured seaman on H.M.S. *Supply* and no other person amongst the colonists, and that it was extensively distributed amongst the aboriginals over the continent of Australia, or at any rate over the south-east part of the continent, there is little of accurate information in the available records.

There has been a great deal of speculation as to the source of the disease, and the following hypotheses have been advanced :—

Tench, in his *Complete Account of the Settlement of Port Jackson*, says :—

No solution of this difficulty had been given when I left the country in December, 1791. I can therefore only propose queries for the ingenuity of others to exercise itself upon—

1. Is it a disease indigenous to the country ?
2. Did the ships under M. de la Perouse introduce it ? Let it be remembered that they had now been departed more than a year, and we had never heard of its existence on board them.
3. Had it travelled across the continent from its western shore, where Dampier and other European voyagers had formerly landed ?
4. Was it introduced by Mr. Cook ?
5. Did we give it birth here ?

No person among us had been afflicted with the disorder since we quitted the Cape of Good Hope, seventeen months before.

It is true that our surgeons had brought out variolous matter in bottles, but to infer that it was introduced from this cause were a supposition so wild as to be unworthy of consideration.

There is yet another hypothesis advanced by Cleland (*see* p. 165) to the effect that the disease was introduced upon the northern coast of Australia by Malay traders, pearl-divers, beche-de-mer and trepang fishers.

If either the First Fleet or la Perouse's Fleet was responsible for the introduction of the disease, then a very long period had elapsed before it had made itself manifest. The First Fleet arrived on 26th January, 1788, la Perouse's Fleet remained from January to March, 1788, and the small-pox epidemic was not noticed until April, 1789. Even allowing for the fact that an

extensive outbreak of small-pox is usually preceded by scattered cases, twelve months is an unduly long interval for this phenomenon.

The occurrence of small-pox on the First Fleet during its outward voyage, which is suggested by Tench's remarks, is not at all probable. No other printed account of the voyage makes any reference to it. Phillip, in a letter to Lord Sydney (1790), states definitely that it never appeared during the voyage out (*see* p. 147), and the present writer has had the opportunity of perusing an unpublished diary of the voyage, kept apparently by a subordinate officer, in which no reference whatever is made to any case of small-pox, though minute details of other cases of sickness are recorded.*

King refers to it as follows, "This dreadful distemper, which, there is no doubt, is a distemper natural to the country . . .," and thus obviously adopts the view that the origin need not be sought amongst circumstances connected with the arrival of either the English or the French.

The hypothesis that the French Fleet was responsible has some support in a statement made in 1804 by Dr. Jamison in his report quoted elsewhere. He says:—"It is generally accredited by the medical gentlemen of the colony on its first establishment that the small-pox had been introduced among the natives by the crews of the French ships then lying in Botany Bay."

There remains the remark of Tench that "our surgeons had brought out variolous matter in bottles." This variolous matter cannot be dismissed lightly as a possible source of the epidemic. It is at least as likely a theory as that of the introduction by the French sailors.

But this question can never be settled unless some hitherto undiscovered records come to light.

It does not appear that the evidence advanced by Cleland in favour of his hypothesis is very convincing, and pending the discovery of more satisfactory information, the safest course would seem to be to follow the generally accepted theory that the introduction of the disease amongst the aborigines was in some way associated with the arrival in Australia of a comparatively large number of Europeans.

Evidences of the outbreak in 1789 have been found in New South Wales, Victoria, and South Australia, but the epidemic appears to have subsided, or at any rate been latent enough to escape remark, until 1829 or 1830. There are several authoritative references to an epidemic about those years, which was recorded more especially from the Lachlan and Murrumbidgee districts, but in all probability also extended into Victoria and along the Murray as far as South Australia. Tidswell states that it persisted in Victoria until 1845. The information available with regard to this second occurrence is meagre enough. Whether it was a recrudescence of the original epidemic, or whether it was a re-introduction cannot at present be determined; that it was actually small-pox is rendered almost certain by the account quoted in the *New South Wales Medical Gazette*, 1874-5, p. 26, in which Dr. Busby gives an account of the disease, which was, about the year 1830, "raging among the black natives of the Bathurst District," and the discussion therein contained of the cause of the disease. This account and another by Dr. Bennett are quoted as appendices. Flanagan gives another reference

* This diary is in the possession of Mr W. Dixon, of Sydney, to whose courtesy I am indebted for the opportunity of obtaining this information.

to this epidemic (*see* p. 150). That there were two distinct periods of undue activity of small-pox amongst the aborigines seems to be beyond doubt. The origin of either or of both, and the relationship, if any, between the two occasions are matters on which no definite statement can be made.

Quite apart from these two occasions is that epidemic of which fleeting glimpses are caught from the references quoted by Cleland. From these it appears to be clear that there was an epidemic of small-pox introduced into the Northern Territory at some time during the decade 1860–1869, probably in the earlier years. This epidemic doubtless is closely associated with that of which there are incomplete official reports made at the time, which affected the natives in the Geraldton and Gascoyne districts, Western Australia. All the facts available with regard to this occurrence in Western Australia are given on page 65.

The history of small-pox among the aborigines may, therefore, be considered to be completely summarized by the statement that the evidence available instances three separate occasions upon which small-pox attacked the aborigines in large numbers and with extensive mortality, and that, while there is no certainty upon the matter, it appears probable that the first if not the second outbreak was introduced on the eastern coast, and the third outbreak by Malay fishermen on the northern seaboard.

It would have been highly interesting if some trained observer could have recorded the epidemiological facts associated with the occurrence of this disease amongst a population to whom the disease was presumably previously unknown, but as it is, the student can only lament the lack of exact details and regret that nothing is known of the methods by which the disease was transferred from one to another of widely scattered and almost completely isolated communities, and that no light is shed upon the reasons for the slow rate of spread from district to district.

Native-pox.—The known facts with regard to the condition called native-pox may now be reviewed, but while it may be permissible here to speculate as to the exact identity of this condition and to wonder to what extent it represented modified small-pox, yet after all this must remain a matter of speculation, or of certain historical interest without any real value from the epidemiological point of view. A statement made in 1848 is not without interest in this connexion. The following extract from the *New South Wales Medical Gazette*, August, 1872 (p. 352), includes this statement:—

Mr. Aaron delivered a lecture at the School of Arts in 1848, which was published in the *Atlas*. The lecturer stated at the time that small-pox was unknown in New South Wales, but that native-pox was prevalent, and of such a character that, if properly fostered by want of sanitary regulations, it would in all probability prove nearly as fatal as small-pox itself.

The references quoted hereunder constitute all the information that can be obtained about the disease known in the earlier days as "native-pox." They are unsatisfactory, for, setting aside the references in the daily lay press there are only three sets of references.

- (1) A brief reference by Dr. Hall in 1863.
- (2) Short references to the subject by Dr. Thomas and Dr. Cutts in 1865 and 1867.
- (3) A discussion at the Medical Association meeting at Adelaide in 1884.

The medical men at the Adelaide meeting were almost unanimously of the opinion that the condition under discussion was identical with *impetigo contagiosa*. But the complete acceptance of their opinion must be limited by the considerations that of the six who expressed their opinion three stated that they had never seen the disease amongst the natives, and that the discussion took place in 1884—a very late period for any reliable opinion to be formed.

The evidence afforded by Drs. Thomas, Cutts, and Hall is somewhat unsatisfactory. On the one hand there are such statements as “it frequently occurred as an epidemic”; “at first it had all the appearance of the chicken-pox, when mild it did not go beyond the vesicular state, but frequently, especially if the patient was out of health, it proceeded to the pustular stage, incrustations formed, and it presented all the characters of impetigo”; “the disease is a spurious kind of chicken-pox. Before a return of the cause of death was given by medical practitioners, it was rather a frequent entry in the records by undertakers and non-medical reporters. It prevailed extensively in one of the convict nurseries, and though no fatal cases occurred, the accompanying fever was often severe. It is quite as contagious as the other exanthemata.”*

The above statements are not inconsistent with the hypothesis that the disease was actually small-pox, yet it seems improbable that two acute observers like Drs. Thomas and Hall should not have recognised small-pox—a disease with which they must have been familiar.

As against such a hypothesis are remarks such as the following:—“If not treated properly it became a very troublesome complaint, lasted for months, was very difficult to cure, and sometimes proved fatal from derangement of the alimentary canal”; “that intractable eruption known as the colonial-pox.” These descriptions do not at all harmonize with the course of small-pox.

As it is stated by Tidswell that small-pox was present amongst the aborigines in epidemic form as late as 1845, it is quite possible that the term “native-pox” was applied loosely, and that it may have included genuine small-pox.

At this date it is impossible to do more than record the opinions of those who had seen the disease that it was some condition other than small-pox. But the reflections evoked are similar to those arising from a perusal of records relating to other phases of the history of small-pox in Australia, and as it is impossible to overlook the unvarying repetition of the diagnosis of chicken-pox in the cases of the first patients of every epidemic, an uncomfortable feeling is engendered by Dr. Hall's remark that the disease was “a spurious kind of chicken-pox, and was quite as contagious as the other exanthemata.”

The following are the extracts which have been referred to on page 3:—

Native-pox.—This nosological term is peculiar to these colonies. The disease is a spurious kind of chicken-pox. Before a return of the “cause of death” was given by medical practitioners, it was rather a frequent entry in the records by undertakers and non-medical reporters.

It prevailed extensively in one of the convict nurseries when under my charge, and though no fatal cases occurred, the accompanying fever was often severe. It is

* These remarks apply to the period 1830-1863.

quite as contagious as the other exanthemata. I have seen it break out at the same time that the child was under the vaccine influence.—“Epidemic Disease of Tasmania,” Hall, p. 84.—*Trans. Epidem. Society*, Vol. II., Pt. i, p. 84.

In a review of the diseases that were prevalent in Victoria in the period 1839–1853, Dr. Thomas states as follows:—

A skin affection which many suffered from was the “native-pock,” as people called it. Children were very liable to it, and it frequently occurred as an epidemic. At first it had all the appearance of the chicken-pock; when mild it did not go beyond the vesicular state, but frequently, especially if the patient was out of health, it proceeded to the pustular stage, incrustations formed, and it presented all the characters of impetigo. If not treated properly it became a very troublesome complaint, lasted for months, was very difficult to cure, and sometimes proved fatal from derangement of the alimentary canal, with which it was almost invariably allied, and to this part of the system the treatment should be directed. The best treatment I found consisted in alteratives and blood tonics.

Later on in the same paper he says:—

The commonest skin diseases are Herpes, Eczema, Lepra, Impetigo, and Porrigo.—Extract from Presidential Address in *Australian Medical Journal*, 1865, p. 80.

In his Presidential Address, Dr. Cutts says:—

How many of us, for example, are agreed as to the precise nature of colonial fever? Is it a bilious fever or the common typhoid of the old country, or something else, or sometimes one thing and sometimes another? Again, which of us is prepared to give a scientific definition and history of that intractable eruption known as the colonial-pock, or that equally troublesome skin disease the vulgar call the colonial itch? If the opinion of the members present were taken, even on familiar subjects like these, I have no doubt the result would show how much we have still to learn of the diseases peculiar to this colony.

Dr. Thomas, in a letter commenting on this, says:—

Having been in practice in Melbourne for so long a period, and at a time when colonial fever and pock were much more rife than they have been of late years . . . The colonial-pock I look upon as synonymous with impetigo, and the colonial itch with prurigo.

—Extracts from the *Australian Medical Journal*, 1867, pp. 53 and 96.

A letter of Dr. Mueller, of Yackandandah, in the *Argus*, describing a hybrid case, ho (Dr. Cutts) believed it to be colonial-pock. The points of distinction were:—That the vesicles were not of uniform size; on bursting they left a sore which left a purple mark, which remained a long time; also the vesicles were larger relative to the base on which they rested. The vesicle overhung the base, which was not the case in variella, and colonial-pock may be a form of variella.—*Australian Medical Gazette*, 1881–2, p. 31.

The following views as to the nature of “native-pock,” or “colonial-pock,” as it was sometimes called, were expressed at a meeting of the South Australian Branch of the British Medical Association in October, 1884. The discussion followed on the reading of a paper by Dr. Lendon on the Border Town outbreak (*see Australian Medical Gazette*, November, 1884, p. 65):—

Mr. Hayward considered that the so-called “native-pox” was simply *impetigo contagiosa*.

Dr. Thomas could see no difference between “native-pox” and the various impetiginous diseases which occur in Great Britain, any more than he could detect anything specially characteristic in scabies as met with in this colony. His experience had only been amongst Europeans, so that he could not say that there might not be some form of pustular disease peculiar to the natives.

Dr. Paterson agreed with the previous speakers that there was nothing specially characteristic about the so-called native-pox, and that it corresponded to the description of acno-pustulosa or *impetigo contagiosa*. He had seen it in white children, but never in aboriginals. If the pustules alone were considered, there might be a difficulty at times in distinguishing between the eruption of native-pox and modified small-pox, but he

thought a correct diagnosis could always be made by referring to the history of the case and the sequence of symptoms, small-pox being always an acute eruptive disorder running a definite course, whereas native-pox was more chronic, there being successive crops of pustules during the progress of the disease.

Dr. Macintosh had never seen what is called "native-pox" among the natives. He said it was totally distinct from small-pox: it was more like impetigo.

Dr. Verec said he could not recognise native-pox as a distinct disease from impetigo or varicella.

Dr. Gosse differed from Dr. Verec in thinking that patients had a difficulty in distinguishing between chicken-pox and native-pox: it was rather that they called all scabby eruptions in children by the name of native-pox. In his own mind he had no difficulty in recognising the disease as *impetigo contagiosa*. He thought it would be a good thing if the profession took more pains to eradicate the name of "native-pox."

In the discussion that took place in the columns of *The Argus* of Melbourne, in 1877, and which is reprinted in full on pages 154-161, as it appeared in the *Australian Medical Journal* of January, 1877, appear the following references to "native-pox":—

In reply to M.D.'s letter in this morning's *Argus*, permit me to say that I have seen scores of natives pitted with what was called in the bush "native-pock," and have known its effects to be mistaken even by experts for those of small-pox.

I cannot remember any disease such as native-pock having affected them in this manner (viz., blindness), or even deeply pitting them to any extent so as to disfigure them.

As regards native-pock, unless a sort of pustular itch from which both the blacks and their dogs used to suffer be indicated by the term, I may frankly confess that I never saw during my 35 years' experience anything among them to which I can suppose it to refer.

An interesting reference to this condition appears in the *Australian Medical Journal* (1846, p. 53) as follows:—

"Hitherto this colony has been exempt from small-pox. We are aware that a disease which has appeared, and proved very destructive among the aboriginal tribes at various times, is supposed to be small-pox, but there is no distinct evidence on that point. If it were, it would be a curious question to ascertain how it came among them, and how it happened not to have extended to the white population, a large proportion of which must, from the want of vaccination, have been so favourably situated for its reception. The condition known by the name of "native pock" is doubtless a *varioid* disease, but resembles more a severe form of varicella than true variola."

CHAPTER II.

SMALL-POX AMONGST THE WHITE POPULATION OF AUSTRALIA, 1788-1850.

The first recorded cases of small-pox amongst Europeans in Australia were some people who were attacked by the disease during its epidemic occurrence amongst the aborigines in 1830.

Dr. Mair, in his report already referred to, speaks of some Europeans which were attacked by it. He says:—

It was not confined to the aborigines, but in one instance attacked a European in the form of secondary small-pox, and proved fatal to a child with symptoms resembling confluent small-pox.—(*New South Wales Medical Gazette*, 1870-1, 219.)

Dr. Busby, in his report on the same outbreak (quoted in full on page 148), describes the course of the disease in a European named Titman, who may or may not have been the same as that referred to by Dr. Mair.

The only reference to possible small-pox in Europeans between these cases and the epidemic in Victoria in 1857 is the following remark extracted from a letter published in the Melbourne *Argus* in February, 1877, and quoted in the *Australian Medical Journal*, February, 1877, p. 59. The letter is signed "A Victorian of 38 Year's Standing," and the remark is as follows:—

In the early days of the Colony, three or four of my children were afflicted with the native-pock, and of so virulent a form as to necessitate medical attendance. The disease, however, passed away, leaving no trace behind, save in one instance, in which there is a mark quite as distinct as, and very similar to, those left by small-pox.

The date on which these children were attacked must have been subsequent to 1839, and as it is more than doubtful whether these cases can be considered as being small-pox, they need not be further considered.

Although, with the exception of the cases previously referred to and reported by Dr. Mair and Dr. Busby (*see* p. 148), there is no definite record of the existence of small-pox amongst Europeans in New South Wales before the case of W. A. McG., at Newcastle, in 1874, yet the history of small-pox in Australia presents such numerous instances of confusion in diagnosis that it is legitimate to ask whether the following remark has any significance. In an "editorial" in the *New South Wales Medical Gazette*, 1871-2, p. 340, it is stated that—

Several cases of severe chicken-pox have at various times occurred in Sydney, and have been supposed by medical practitioners at the time to be the true variola, but this opinion has been subsequently refuted, nor have we any reliable record that leads us to suppose that variola vera has ever been present in New South Wales.

Having recorded this statement, no more can be said about it. It affords, however, another of those suggestions, frequent enough, which make one wonder to what extent the officially reported outbreaks of small-pox represent the real incidence of the disease.

Again, in the same journal (1872-3, p. 138), in a leading article it is stated that "Small-pox has been on two occasions entirely stamped out of the Colony." "The Colony" is New South Wales. No satisfactory record has, after prolonged search, been found of these two occasions. The two epidemics amongst the aborigines, viz., in 1789 and in 1830, appear to be definite enough,

and, in addition, there is the statement in Heaton's *Dictionary of Australian Dates* that "Small-pox made its appearance in Sydney on 25th July, 1825." Although the files of the *Sydney Gazette* for 1825, and all other probable sources known to the authorities of the Sydney Public Library, were well searched, no other reference to this occurrence in 1825 could be discovered.

There is, however, a footnote in a work by Mr. P. Beveridge on Colonial Ethnology as follows:—"Small-pox raged in Sydney about 1829 or 1830." (*See Aust. Med. Gaz.*, 1897, p. 493.)

In the annual report (1865) of the Government Medical Officer (New South Wales) on the subject of vaccination, it is stated, in discussing the difficulties in the way of inducing the people to be vaccinated, that—"As this colony has never seen small-pox it is natural"
In the light of well-established facts, this statement cannot be accepted, but it is an interesting example of the way in which authoritative statements by responsible officials have been made without due consideration or exact knowledge.

In Bent's *Tasmanian Almanack* for 1829, also (p. 125), there is an entry as follows:—

1828, September.—The small-pox and whooping-cough making sad ravages among the infant population of New South Wales.

The other references, however, quoted on p. 77, make it clear that the disease did not attack the resident population, and the "ravages" must have been due to whooping-cough. The date given by Heaton, 25th July, corresponds so closely with that on which the *Bussorah Merchant* arrived, 26th July, that it is almost certain that this vessel's arrival is being referred to.

In both the Second (1827) and Third (1828) Editions of Cunningham's *Two Years in New South Wales*, it states that small-pox is unknown, but it must be remembered that Cunningham left New South Wales in 1826.

"Small-pox in Sydney, 1838."—Hirsch* states as follows (Vol. I., p. 133):—

The continent of Australia, up to 1838, had enjoyed an absolute immunity from small-pox: towards the end of that year the disease appears at Sydney, having been imported probably from China: it lasted, however, only a short time, and remained absent from the continent until 1868.

Hirsch bases this statement upon a reference which he gives, viz., *London Medical Gazette*, 1839, June, p. 477. This article is actually headed "Small-pox at Sydney," but it is very clear that the whole description refers to an outbreak of whooping-cough, and in all probability it referred not to Sydney but to Tasmania, as the first paragraph refers to "the island," and the signature is "V.D.L."

The article is quoted in full as an Appendix (p. 179).

It may be that Hirsch is referring to the outbreak described by Dr. Mair, but it appears to be more probable that he took the title of the article in the *London Medical Gazette* at its face value, and did not trouble to inquire further.

* Geographical and Historical Pathology.

CHAPTER III.

SMALL-POX IN NEW SOUTH WALES AFTER 1850.

In the *New South Wales Medical Gazette*, June, 1871, p. 288, occurs this short note :—

We understand that a few days since the whole of the crew of the H.M.S. *Clio*, now in port, were vaccinated, in anticipation of the expected outbreak of small-pox, which possibly may be present amongst us in a short time.

It is impossible to hazard even a conjecture as to the meaning of this statement. Why an outbreak of small-pox should have been expected at that time it is difficult to understand, as the disease did not exist in any part of Australia. The outbreak at Sandhurst, Victoria, did not occur till the following year.

1874.

The following are the circumstances connected with the case of small-pox in Newcastle, New South Wales, in 1874 :—W. A. McG., aged 40, was an employé on board the Government steam-tug *Ajax*, of Newcastle.

On 29th June, 1874, he first developed symptoms—rigors, pain in the back, nausea—and from that date passed through a genuine attack of small-pox; and died on 11th July. The patient is stated to have been vaccinated, but close and careful examination revealed only a single mark, about the genuineness of which there was considerable doubt. The patient himself believed that he had been vaccinated, but could not remember the operation being performed. Dr. Knaggs, who was, if a judgment can be formed after nearly 40 years from his writings, a particularly acute observer, states that :—

I closely questioned the patient in order to ascertain if possible by what means he could have obtained contagion, but could obtain no satisfactory information except that he had been in the habit of frequenting the shipping of the port of Newcastle.—(*New South Wales Medical Gazette*, 1873-4, p. 340.)

The source of the infection in this case must remain obscure. It is stated by Dr. Ward, who was sent up from Sydney by the Government to examine the case, that—

Dr. McGrath, the acting Health Officer stated that he was not aware of any cases of small-pox having taken place in any of the vessels in the port during the whole month of June.—(*Loc. cit.*, p. 372.)

and further on—

As far as is known there is no small-pox at present in any part of the Australian continent, and McGowan had not been out of the Colony for the last twelve months at least. Small-pox is not and has not been known to be amongst the population in the town of Newcastle.—(*Loc. cit.*, p. 375.)

The man, McG., was, as stated, employed on the Government steam-tug, and his duties were such as not to involve the necessity for boarding ships.

That this case was genuine small-pox there can be little doubt. The description given on pp. 341-2 of the *New South Wales Medical Gazette*, 1873-4, is convincing, while the patient himself, who had seen a great deal of small-pox in the West Indies, declared his own affection to be that disease. The possibility of the introduction of the disease by fomites cannot be overlooked, but there is absolutely no single recorded fact to support that hypothesis.

In this instance, also, the oft-repeated tale has to be told once again—Drs. Bedford and Ward, sent up from Sydney by the Government, declared that “they were of the opinion that it was *not* a case of true variola, but a very aggravated case of varicella.”—(*Loc. cit.*)

An interesting fact in connexion with this case is worth recording. A child of the patient McG., aged about 3 years, slept on the same bed with the patient from the onset of his disease until the third day of the rash. It was vaccinated on that day only, and thereafter slept elsewhere. Neither this child nor any other member in the household contracted the disease. Nor did the disease appear except in this one patient.

1877.

On 12th December, 1877, it was discovered that there was a case of small-pox on board the steamer *Brisbane*, lying in Sydney Harbor, after her arrival in port. The patient was landed from the ship on the 13th, and died on the following morning. This was the first case.

A second case of small-pox was landed from the ship on 18th December at the Quarantine Station, whither the ship had been removed on the discovery of the first case.

No other case appears to have occurred on the vessel herself, and she seems to have been released from quarantine on 27th January. The Master was fined £100 for breach of the quarantine regulations in giving false information at the time of arrival in port.

On 30th December a case of small-pox was discovered in a small house on the wharf, next to the wharf where the steamship *Brisbane* had berthed. This patient, a young woman, had a very severe attack, but there is no record of either her death or recovery.

There is no evidence to show how this patient contracted the disease. All that can be said is that the dates are consistent with infection from the *Brisbane* during the time she was moored at the wharf.

On 11th January two girls, members of the Holden family at Miller's Point, were taken ill, and although the City Health Officer at first declared that the disease was not small-pox, it subsequently proved to be so. On 14th January, the daily press reported as follows:—

Another of the Holden girls, aged 16, died yesterday on board the hospital ship.

Whether this was a third member of the family or the second of the two above is not apparent. At any rate, that two deaths had occurred in the Holden family up to 14th January is certain. On 15th January the father of the Holden family became ill with the disease.

On 29th January is the report that “the remaining child of the Holden family died on Saturday night.”

Apparently three children (all of whom died), and the father, were attacked in the Holden family.

On 18th January a case appeared on the H.M.S. *Wolverine*, one of the fleet of men-of-war lying in Sydney Harbor. Three more cases appeared on this vessel and one on the *Sappho*, all of which had been diagnosed by 20th January.

The daily press (*Sydney Morning Herald*, 25th January, 1877) states that :—

The war authorities have obtained information which leads to the opinion that the sailor first attacked on board the *Wolverine* had been in contact with the Holden family at Miller's Point. All the other seamen who have got the disease are supposed to have taken the contagion from this man.

It cannot be that the first sailor infected the others, as he only became ill on 18th January, and all the others were diagnosed before 20th January.

It is further doubtful whether any of them were infected from the Holden family, as the first two girls in this family only first became ill on 11th January.

The above facts, collected by the editor of the *Australian Medical Journal* (*vide Australian Medical Journal*, 1877, p. 12), are incomplete and admittedly inexact. There is a strong probability that some of the cases were due to the introduction of the disease by the s.s. *Brisbane*, for the rest, all that can be said is that twelve cases occurred, all connected with shipping or within the shipping zone. They were: two cases from the *Brisbane*, one young woman living near the wharf, four members of the Holden family, and five sailors in Her Majesty's fleet. Apparently from this account there were four deaths, viz., three Holden children and the seaman—the original case—from the *Brisbane*.

Heaton's *Dictionary of Dates* (p. 259), however, in describing this outbreak, states that "Four of the children of a man named Holden died."

Naturally, it cannot now be determined which of the two statements is correct. It is clear, however, that either four or five deaths occurred.

THE EPIDEMIC OF 1881-2.

The most serious outbreak of small-pox ever recorded in Australia occurred in Sydney during the year 1881, the first case occurring on 23rd May, 1881, and the last case on 19th February, 1882. During the whole of this period of 271 days the city and suburbs suffered more or less from variola, the total number of cases amounting to 154.

The following facts relating to this epidemic are taken from the official report of the outbreak which was presented to Parliament in 1883.

ORIGIN OF THE OUTBREAK.

The report referred to, and contemporary medical journals, are agreed in the statement that the original source of infection is obscure. The first reported case occurred at the house of a Chinaman, at number 223 Lower George-street. From the fact that a Chinese house was the first attacked, one might be tempted to deduce an Asiatic origin for the disease. Such a deduction, however, would not however be justified, and in spite of the fact that this case created a great deal of anxiety and apprehension in Sydney, and therefore, presumably, evoked searching inquiry, there is absolutely no evidence of the origin of the disease in this first case.

SUBSEQUENT COURSE OF THE EPIDEMIC.

It is greatly to be regretted that "no reliable statistics exist from which the probable source of infection can be traced in cases occurring before the 2nd of September, 1881."—(*Vide Official Report*, p. 2.)

Subsequent to the first case a period of twenty days elapsed before the disease again showed itself, when between the 5th and 15th of July it appeared

in seven houses, each situated in a different locality. The disease was reported in two different localities on the same day 22 times, in three localities on the same day once, and in four localities also once. During the period already referred to, that is prior to 2nd September, during which no reliable statistics were kept, the disease is known to have occurred in the following localities:—

Lower George-street, Surrey Hills, Cumberland-street, Waterloo, Queen's-place, Druitt Town, Glebe, Sussex-street, Fowler-street, Macquarie-street south, Ultimo, Croydon, Woolloomooloo, Alexandria, Clarence-street, Barker's-lane, Pyrmont.

It is obvious from this that the disease was widespread throughout the city and suburbs. "The disease generally attacked the labouring classes, including two Chinamen, and, as might be expected, it proved more prevalent and fatal among those occupying badly drained houses and residing in neighbourhoods the sanitary condition of which was seriously at fault." The following factors are stated in the report to have been the principal influences favouring the spread of the disease: first, overcrowding; secondly, small size of rooms; thirdly, insufficient window space; fourthly, habits of uncleanliness; and fifthly, the impossibility of insuring isolation of the patient in respect to the other inmates. The disease was disseminated in five instances from houses after they had been quarantined, to adjoining houses, but the disease was chiefly conveyed to fresh centres by communication between infected persons and others before the first cases were reported.

During the period after the 2nd of September, during which accurate statistics were kept, 103 cases developed. In 24 of these the means of infection could not be traced, while in 79 the infective source was successfully made out with the following results:—

In four instances the disease occurred during the progress of other cases in the same house.

In five, the disease extended from an infected house to that adjoining.

In ten, the probable cause was the close proximity of an infected house.

In five, it was ascertained that the patient had previously visited at, or received visitors from, infected houses, while in seven other instances the disease was supposed to have been contracted by persons working near to, or frequently passing, infected houses.

In two cases the disease attacked men doing duty as special constables in quarantining houses, and in eight instances it appears highly probable that unreported cases had previously existed in the patients' houses.

It is interesting to note that amongst those persons removed to the Quarantine Station seven developed small-pox after arriving at the station, and it is quite clear that the carelessness of the authorities in permitting free contact between some of the patients and some of the others isolated was directly responsible for some, at any rate, of those cases.

Table A shows the districts affected, the number of infected houses, the total number of people living in those houses, and the number of cases which appeared in those houses. The table is interesting, especially by reason of the fact that it reveals the very low attack rate in the infected houses. Of the total number of 500 persons more or less exposed to infection at close range, only 148, or 29·6 per cent., developed the disease.

MORTALITY.

The total number of deaths throughout the epidemic was 40, or 25·9 per cent., of the patients attacked.

VACCINATION.

The statistics regarding vaccination were commenced on the 2nd of September, 1881.

Of the 40 patients who died, 29, or almost three-quarters, had never been vaccinated, ten had been vaccinated in early life (of these there is only one under 17 years of age, and all had been vaccinated in infancy), and of one there is no record.

Thus of the total number of deaths in which vaccination or non-vaccination has been recorded, 25 per cent. occurred amongst vaccinated patients, and 72·5 per cent. amongst unvaccinated persons.

Of the patients who were attacked by the disease, and about whose condition of vaccination details are recorded, 103 in number, 47, or 45·6 per cent., had been vaccinated at various ages. The details of these cases are set out in Table B. The following extract from the official report contains interesting data concerning individual cases :—

Of the total 154 cases of variola, it will be observed that in 42 instances the disease was contracted from an inmate of the same house, and of these a large proportion was contributed by instances in which the father of a family, being a disbeliever in vaccination, had not allowed his children to be vaccinated, and the disease struck down, with more or less fatal effect, many members of the household. Thus in one family at Pymont, consisting of ten members, six cases occurred, two of which terminated fatally. Of the members who escaped, two were vaccinated some time previously, and the other two the day after the house was quarantined. The six members of the family who had been struck down by the disease had never been vaccinated.

In another family, consisting of eight persons, residing at Woolloomooloo Bay, six unvaccinated members had small-pox and two vaccinated members escaped.

In another family in Sussex-street, consisting of six members (all unvaccinated), five cases occurred.

Another example of the protective power of vaccination occurred amongst the members of a family in Arthur-place, of whom three were unvaccinated and one was vaccinated. The three former contracted the disease, and the latter escaped.

In another family, consisting of five members only, two of whom were vaccinated, the three unvaccinated members of the family alone suffered from the disease.

Although the official report, which was written in 1883, describes only cases occurring in Sydney, yet contemporary medical journals have recorded other cases. One case was recorded from Bega (a township 255 miles south from Sydney) in January, 1882. It is supposed that a relative of this patient only recently returned from Sydney, where she resided next to an infected house, carried the infection to the district. In February of the same year, a case was reported from Lismore (*Australasian Medical Gazette*, January–February, 1882, pp. 57 and 70).

Bearing in mind the oft-repeated story of the confusion between chicken-pox in times of epidemic and small-pox, it is interesting to note that the *Australasian Medical Gazette* reported in June, 1882, that “some cases of varicella and scarlet fever had been reported at Albury.”

It is very probable that the number of cases stated to have existed (154) does not represent by any means the total number of cases that occurred. The report states :—

Up to the 20th December, 1881, it was optional with medical men and householders whether they should or should not report cases of true or suspected variola, and it is

beyond doubt that cases occurred which were not reported and that some of these were concealed by medical men who were aware of the true nature of the disease.

It is unfortunately equally clear that some of these suspected cases led to the extension of the evil, and in some cases to fatal results.

The probable reason for the concealment by medical men of the cases was that the first two medical men who reported cases were quarantined against their will for some months. The measures taken to suppress the epidemic were those specified for each of the other epidemics recorded, with this difference, that while in some directions a quite unnecessary degree of severity was displayed, in others, there was considerable neglect.

One small measure stated to have been adopted which is not recorded in any of the other epidemics was that mosquito nets were fixed over the windows of rooms occupied by patients. It is very unfortunate that such a wide-spread epidemic—the largest which has ever occurred in Australia—is so inaccurately and incompletely recorded. Very valuable information might have been obtained and tabulated, but this is now absolutely lost. The facts, however, that were obtained have been recorded above. The total cost of the epidemic to the State is stated in the *Australasian Medical Gazette* to have been about £100,000. A Parliamentary return, however, gives a statement of the expenses, from which it appears that the amount involved was £84,143 13s. 4d.*—(*Australasian Medical Gazette*, 1884, p. 110).

TABLE A.—SHOWING THE VARIOUS CENTRES OF SMALL-POX DURING THE EPIDEMIC.

District or Street.	Date of the First Appearance of Small-pox.	Date of the Release of the Last House in the District.	Number of Infected Houses.	Number of Persons living in those infected Houses.	Number of Cases of Small-pox.
George and Cumberland streets ..	25th May	1st Dec.	5	26†	4
Surrey Hills ..	14th June	7th Jan.	6	35	7
Waterloo ..	16th ..	20th Dec.	3	16	7
Druitt Town ..	5th July	27th Aug.	1	9	1
Glebe ..	7th ..	8th Feb.	5	28	6
Sussex-street and District ..	8th ..	3rd Jan.	20‡	118	37
Ultimo ..	11th ..	30th Dec.	4	26	6
Woolloomooloo ..	25th ..	14th Jan.	10	51	17
Alexandria ..	1st Aug.	8th Feb.	3	19	4
Croydon ..	8th ..	8th Sept.	1	5	2
Darlington ..	10th ..	15th ..	1	4	2
Balmain ..	12th ..	22nd ..	1	3	3
Pyrmont ..	12th ..	8th Feb.	14	72	31
Haymarket ..	16th ..	13th Sept.	1	17	2
Woollahra ..	29th ..	26th Oct.	1	5	2
McDonald Town ..	2nd Sept.	4th Oct.	1	10	1
Botany ..	4th ..	4th Nov.	1	3	2
Camperdown ..	5th ..	7th Jan.	2	6	2
Redfern ..	5th ..	14th ..	2	10	3
Pennant Hills ..	8th Oct.	1st Dec.	1	3	1
Burwood ..	5th Nov.	3rd ..	1	5	1
Liverpool-street ..	19th ..	2nd Feb.	4	29	7

* Quoted in a resolution of the Board of Public Health of Victoria, on 11th September, 1895, on the subject of compulsory infantile vaccination.

† These are Europeans, the number of Chinese in this district is not known.

‡ Two of these houses had no infection in them.

TABLE B.—SHOWING THE PROPORTION OF PATIENTS WHO SUFFERED FROM SMALL-POX; THOSE WHO WERE VACCINATED AND THE RESULTS FROM 2ND SEPTEMBER TO THE END OF THE EPIDEMIC.

Age of Patient.			Never Vaccinated.	Vaccinated.					Result.	
				Under 5 years.	5 to 10 years.	10 to 20 years.	20 to 40 years.	Over 40 years.	Died.	Recovered
29	×	×
1	×	×
5	×	×
49	×	×
18	×	×
2	×	×
1	×	×
5	×	×
10	×	×
17	×	×
21	×	×	×
45	×	×	..
26	×	×
23	×	×
6 months	×	×
29	×	×
25	×	×
20	×	×	..
42	×	*	×
23	×	×	..
52	×	×
6	×	×
1	×	×	..
14	×	×
36	×	×
9	×	×	..
5	×	×
1	×	×	..
3	×	×
4	×	×
2	×	×
40	×	×
44	×	×
7	×	×
30	×	×
34	×	×	×
43	×	×	..
47	×	×	..
26	×	×
4	×	×
2	×	×
47	×	×
6 months	×	×
22	×	×
6	×	×
38	×	×
27	×	×	×
27	×	×	×
1	×	†	×	..
22	×	×
1½	×	×	..
33	×	×

* Eleven days before attack.

† Five days before attack.

Table B.—Showing the Proportion of Patients who suffered from Small-pox, &c.—*continued*.

Age of Patient.			Never Vaccinated.	Vaccinated.					Result.	
				Under 5 years.	5 to 10 years.	10 to 20 years.	20 to 40 years.	Over 40 years.	Died.	Recovered.
14	×	×	×
6	×	×	..
17	×	×	..
24	×	×
27	×	×	..
42	×	×	..
62	×	×
20	×	×	..
6	×	×
3	×	×
1½	×	†	×
49	×	×	†	×
40	×	×	..
Man	×	×	..
7	×	×
9	×	×
7	×	×
8	×	×
4	×	×
4 months	×	×
Man	×	×
19	×	×
9	×	×
1	×	×	..
25	×	×
16	×	×	..
25	×	×
21	×	×
5	×	×
9	×	×
10	×	×
32	×	×	..
30	×	§	×	..
24	×	×
39	×	×	×
13	×	×
26	×	×
24	×		×	×	..
15	×	×
3	×	×
1½	×	×
37	×	×
35	×	×
6	×	×	..
4	×	×
36	×	×
2	×	×	..
37	×	×
32	×	×
32	×	×
5 days	×	×	..

* Nine days before attack.

† Ten days before attack.

‡ A few days before attack.

§ Five times unsuccessfully.

|| Both unsuccessfully.

TABLE C.—SHOWING THE NUMBER OF CASES, RECOVERIES, AND DEATHS AT VARIOUS AGES.

Ages.	No. of Cases.		No. of Deaths.		No. of Recoveries.	
	Male.	Female.	Male.	Female.	Male.	Female.
Under 10 years ..	29	26	8	8	21	18
10 to 20 years ..	8	13	1	2	7	11
20 to 30 „ ..	18	19	5	4	13	15
30 to 40 „ ..	13	8	5	1	8	7
40 to 50 „ ..	9	7	5	1	4	6
Over 50 years ..	1	8	..	..	1	3
	78	76	24	16	54	60

1882-1885.

In the official report of the epidemic of small-pox in Sydney, in 1881-2 (published in 1883), it is stated that “the case which terminated the epidemic was reported on 19th February, 1882, at the Sanatorium.” And yet it is reported in the *Australasian Medical Gazette* (1882, p. 149), that—

A supposed case of variola was discovered at Waterloo, a suburb of Sydney, on 26th July, not far distant from a dwelling in which the disease existed at the time of the late epidemic. Though the Health Officer did not commit himself absolutely to a diagnosis of small-pox, yet it is believed to be undoubtedly a case of that dreaded disease, and the patient was at once transferred to Little Bay Sanatorium.

There were also the cases at Bega and Lismore referred to above, the important fact in relation to which is that they are not included in the official report, and that they therefore indicate a more widespread infection than was officially recognized.

An official return of the meetings of the Board of Health, presented to the New South Wales Parliament in the Third Session, 1883-4, contains an entry—“Feb. 23rd. Case small-pox, Rushcutters’ Bay.” This is presumably 23rd February, 1883. But no other reference to this case can be found in any of the other records.

With this exception there is no record of any cases occurring in New South Wales between July, 1882, and August, 1884. On 23rd August, 1884, five cases of small-pox were discovered at the Orient Hotel, Lower George-street—

From that date until 16th September, fourteen cases were removed and isolated from time to time. An interval of six weeks then ensued, and it was not unreasonably supposed that the disease had been really stamped out.—(*Annual Report on Vaccination*, 1884.)

But on 25th October, another case was reported which led to a further series of cases.

It will be interesting to consider these two groups of cases in detail.

THE FIRST GROUP.

The first five cases all occurred in the one hotel (Orient Hotel), and when discovered to be small-pox, the disease had been in the house for more than a fortnight and had been treated by a medical man as chicken-pox (*Australasian Medical Gazette*, September, 1884, p. 283). These five were: J. McC., aged 2; G. W. M., 38; W. A. McC., 5 months; E. S., 35; J. K., 20.

Of the nine cases subsequently reported, two came from the Orient Hotel, and the source of infection in these cases is discussed by Dr. Ashburton Thompson as follows :—

Of these fourteen cases, nine came from the Orient Hotel. Of the other seven, one (Hughes) was certainly infected by visiting that house, another (Jensen) very probably, and a third (Hillis) perhaps so. Of the remaining four, Saunders was most likely infected by Hammond, judging from the dates at which they respectively sickened. Three cases remain, viz. : Kingston, Hammond, and Olsen, in which the source of infection cannot be named. Kingston received his infection before the Orient Hotel was quarantined and while it was infected, and he may have visited it or have come into contact with one of the inhabitants. Hammond also may have been infected there, but in that case the incubation period must have lasted seventeen days. This is possible but not most likely. In the case of Olsen, if it be granted that the incubation in his case lasted eighteen days the same explanation may be suggested. At all events, this group of cases affords no ground for apprehending an epidemic of small-pox, but every ground for assigning such small spread of the disease as has occurred to contagion not always traced but traceable, although the manner in which the latter was carried cannot be ascertained in the three cases named.

It should be noted that Dr. Thompson, whose reports are usually models of completeness, omits two very important points. At least this is so in the extracts quoted in the *Australasian Medical Gazette*. Unfortunately, the original report does not appear amongst the papers ordered by Parliament to be printed. There is no indication of the reason for the appearance of the disease at the Orient Hotel, and although it is apparently assumed that Kingston, Hammond, and Olsen received their infection in some way from the Orient Hotel, yet there is given no evidence that they actually visited that place.

THE SECOND GROUP.

On 25th October a woman named Olive Byrnes sickened. She was first seen by a doctor on 1st November, when she was removed to the Quarantine Hospital. She was visited by Mr. William Baird, jun., on 31st October, and he developed small-pox on 13th November, being quarantined on 16th November. Other cases were reported as follows :—

November 14	..	Mrs. Stratton.
„ 25	..	C. Israel
28	..	Nellie Edwards
		James Brady
		Sophia Barry
		Charles Tyler
„ 30	..	Hermann Dechow (<i>Aust. Med. Gaz.</i> Dec. 1884, p. 63.)

On November 30th, the case of Hannah Christianssen, *æt* 33, of 292 Elizabeth-street, was reported. It transpired on inquiry that this woman lived next door to Mrs. Cohen, in whose service Olive Byrnes had been until 16th October, *i.e.*, about nine days before she sickened. A visit to the Cohen's house revealed the presence of small-pox on the person of her infant son, Joseph Cohen, aged 10 months, who became ill, according to the statement of the parents, on 3rd November. The origin of the infection in the two cases—Byrnes and Cohen—is discussed by Dr. Ashburton Thompson as follows :—

The origin and spread of the contagion which affected this group of cases is an exceedingly interesting and instructive subject. I premise an account of it with this statement, that although the incubation period of small-pox is less than fourteen days rather often, it is very seldom longer; and that in the vast majority of cases it is exactly fourteen days

or precisely thirteen times twenty-four hours. Now, Olive Byrnes having sickened 25th October, she received the infection not earlier than 12th October, or four days before she left Mrs. Cohen's. Did she catch her illness outside the house and, bringing it in (as a mere mechanical carrier), infect Joseph Cohen? Joseph Cohen fell sick 3rd November. He was probably infected therefore not earlier than 21st October, or five days after Byrnes had left the house. She left no things behind her when she went, and she did not return there.

That she should have brought a scab or contagion in a solid form into the house on 12th October, and have left it where the baby could have come into contact with it nine days later, although possible, seems to me to be improbable in the highest degree. Did she infect the baby herself physiologically?

I am not aware of any evidence showing that persons communicate small-pox during the period of incubation, except Curschmann's case, in which a piece of skin taken from a person who was incubating small-pox did give that disease to the person upon whom it was engrafted; but that which is possible under such exceptional conditions is in all probability impossible under ordinary conditions; nor is it known to occur.

The facts of these two cases appear to me to warrant one conclusion only—that Byrnes and Cohen were infected from a common source with which the household was in communication. There seems no reason to suppose that this source existed in the house itself. Either an affected or an infected person visited Cohen's from time to time. The latter may have lived in an infected house, or some member of the Cohen household may have entered an infected house on two, but probably on several, occasions. In either case I conclude that there have been other cases of small-pox than those which have just been discovered.—(*Australasian Medical Gazette*, December, 1884).

Other cases were reported, to the total number of thirteen. In addition to the ten above specified (including Olive Byrnes, Hannah Christianssen, and Joseph Cohen), there were—

Harry Kingsbury,

Rachel Marks,

Emma Low.

To these thirteen must be added two others—a brother of C. Israel and another member of the Christianssen family.

The origin of the infection in these fifteen cases is discussed by Dr. Ashburton Thompson as follows (*loc. cit.*):—

Accepting the Cohen house as a starting point, the connexion between it and all of the other twelve cases has been made out clearly enough. Baird and Stratton were infected by Byrnes, as has already been shown. Israel's case occurred next. He did not know Cohen, and had never been to the house, but his brother was a visitor there (he had fallen ill of small-pox at the quarantine of observation), and he was in his brother's society every day, and one of the Cohen's family often visited the warehouse in which Israel was employed. Edwards was at the Crown-street school, in the upper third class, girls; Low was in the lower third class, girls; and Leah Cohen was in this same class, in the lower division, and continued to attend until 20th November. Marks and Kingsbury were in the fifth class, infants; Rose Cohen was in the same class, and attended until 20th November. Dechow was in the lower third, boys; Samuel Cohen was in this class, and attended until 20th November. Barry was in the lower second class, girls; no connexion between her and Leah or Rose Cohen can be shown, but I believe that all classes mix in the playground. Brady used frequently to meet Isaac Cohen. Tyler did a day's work in Cohen's house. Christianssen (two cases) lives next door to Cohen.

It has thus been shown that on this occasion the spread of the disease has been by traceable contagion, which in all cases but one has been traced, and that there is, therefore, no reason at present to apprehend an epidemic.

Some further light is thrown on these cases by Dr. Mackellar, in his *Annual Vaccination Report for 1884*, as follows:—

The first case was discovered on 23rd August, and from that date to 16th September. fourteen cases were removed and isolated from time to time. An interval of six weeks then ensued, and it was not unreasonably supposed that the disease had been really stamped out. But on 25th October, the case of O.B., female, *æet* 30, was reported. She was isolated, together with two other households which she had visited after her symptoms of illness had declared themselves, and which she had infected. One other case arose by direct contact with her, which was also isolated, and as far as O.B. is concerned there was an end to the mischief caused by her case.

In endeavouring to ascertain the origin of her illness, it was discovered that at the time she must have received the infection she was living as a servant in a certain family. But she had given up her place five days before any symptoms of illness had declared themselves in her, and before she was capable of communicating it. This household was accordingly inspected, and it was found that no source of infection existed or had apparently recently existed in the house, but it turned out subsequently that the only unvaccinated member of the family—J.C., male, *æet* 10 months—although apparently well at the time of the visit of the inspector, was in reality incubating small-pox.

The first symptoms showed themselves three days later, on 1st November. The disease was not recognised as small-pox by the doctor called in, and in consequence the other members of the family were allowed to continue their usual occupations without restriction. The result was as follows:—Two of the patient's sisters and a brother attended the Crown-street Public School, which is the largest in the Colony, during the whole of his illness, ceasing their attendance only on the twentieth day of it. These three children were in three different classes, and in each class cases of small-pox arose, namely, in one class two girls; in another—infants—a girl and a boy; and in a third, one boy, were seized; and in addition a girl was attacked who was not in any of the classes, but who was exposed to contact with J.C.'s sisters during play hours. The adult members of J.C.'s family carried the infection to five other households—a member of one of which fell sick while at Moss Vale—100 miles from Sydney—and there infected the resident whom she was visiting. Yet two other families were infected by this child, but under slightly different circumstances: one residing at Leichhardt was infected through the father, who was summoned to J.C.'s to pursue his trade in the very room in which the latter lay sick, and two persons fell sick in the house next door to J.C.'s. Thus from this single case were infected no less than thirteen distinct households and nineteen different persons, of whom one died.

The source of infection in O.B. and J.C. must have been the same, and must have been a concealed case of small-pox.

O.B. had been imperfectly vaccinated in childhood, one small and very imperfect mark of vaccination done in infancy.—(*Annual Vaccination Report 1884*).

From the records quoted, it would appear that the total number of cases that occurred during the epidemic was 29, but there is a remark, made on 24th April, 1885, by Dr. Quaife, in his presidential address before the British Medical Association, New South Wales, as follows:—"Last year, on 23rd August, a fresh outbreak (of small-pox) took place, which lasted till February, of this year, the port being declared free about the middle of March.* During this outbreak 64 people were attacked, and four died."

This is substantiated by the facts given in an article in the *Australasian Medical Gazette* (July, 1885, p. 240), in which the vaccination histories of 57 cases treated at the Quarantine Station are recorded (*see* p. 22).

Beyond those 29 cases just reported there is no official report concerning the 35 other cases referred to by Dr. Quaife. Occasional notes are to be found in the *Australasian Medical Gazette*, for example—

Three fresh cases of small-pox occurred in the Redfern district, Sydney, on 18th January.—(*Australasian Medical Gazette*, February, 1885, p. 139.)

A case of small-pox was discovered at West Maitland on 30th January.—(*Australasian Medical Gazette*, February, 1885, p. 130.)

On 13th January an unregistered medical practitioner was fined for not reporting a case of small-pox seen by him on 15th December.—(*Australasian Medical Gazette*, February, 1885, p. 126.)

Eleven fresh cases of small-pox were reported in Sydney and suburbs during the last few days in November.—(*Australasian Medical Gazette*, December, 1884, p. 76.) These are probably the latter cases of the second group above described.

Two cases of small-pox are reported from Moss Vale.—(*Australasian Medical Gazette*, January, 1885.)

Five fresh cases are reported from Balmain and Waterloo.—(*Australasian Medical Gazette*, January, 1885.)

* March 17th.—*Australasian Medical Gazette*, April, 1885, p. 176.

It is greatly to be regretted that an epidemic of small-pox of such magnitude that 64 persons were attacked was not officially recorded in greater detail.

The one fact of importance revealed by the reports that are available is that in practically every case reported the source of infection is clearly shown to have been a pre-existing case, and the contact between the patients is shown to have been in each instance very close.

In view of the official declaration on 17th March that the port was a clean one, and in view also of the fact that the last case reported in Victoria to the Central Board of Health in that State was isolated on 20th April, 1885, it is very disconcerting to read in the *Australasian Medical Gazette* of October, 1885, p. 24, that "three cases of small-pox occurred in Randwick (Sydney) on 23rd September at the residence of a horse-trainer, and that two further cases were reported on 26th September—one being a seaman belonging to the A.S.N. Coy's steamer *Gunga*, which arrived from Melbourne the day before. The other occurred in Drutt-street, the centre of a densely-populated part of Sydney." The Health Department of Sydney telegraphed to the Victorian Board of Health on 25th September, 1885, that four cases of small-pox had arisen there, but not stating how it had arisen. (Board's Minutes). The occurrence of these cases after the epidemic had been officially declared to be ended, the unexplained origin of the first group of cases in the Orient Hotel, and Dr. Thompson's remark in reporting on the Byrne case and the Cohen case that "I conclude that there have been other concealed cases of small-pox than those which have just been discovered," all force the student of this epidemic to the conclusion that there was a widespread distribution of small-pox in the metropolitan area of Sydney, and it is not unlikely that many cases passed unrecognised.

In view of the fact that cases of small-pox occurred some six months after the 1881-2 epidemic had been officially declared to be at an end, especially in view of the indefiniteness which appears to have pervaded the official conception of the distribution of the disease, it must be considered as not improbable that this 1884-5 outbreak was merely a continuation of the 1881-2 epidemic, the resuscitation of activity being due to some factor not determined. A sidelight is thrown on the position by the following extract from the *Australasian Medical Gazette* :—

In the Legislative Assembly on 5th April, 1887, the Colonial Secretary, in reply to a question, stated that the cost of the Health Officer's Department during the three years 1880, 1881, 1882, was £32,596 12s. 9d., including the cost of suppressing a small-pox epidemic. In 1885, the cost of the Health Office was £8,103, and in 1886, £6,674, both of which years included the expense of suppressing small-pox :—(*Australasian Medical Gazette*, April, 1887, p. 179).

It is noticeable that the years 1885 and 1886 were both quoted as years when money had to be spent on suppressing small-pox. There is, however, no evidence from any other source that there did exist any small-pox during 1886.

The particulars as to the extent of vaccination in the cases which occurred in Sydney in 1884-5 are recorded by Dr. Service, who was the medical officer at the Quarantine Station during the period when these cases were under

treatment there (*Australasian Medical Gazette*, July, 1885, p. 242). These details are not very complete, but from them is compiled the following information :—

Two of the fatal cases were unvaccinated, but there is no record of the other two.

The other cases may be classified thus :—

	Confluent.	Semi-Confluent.	Discrete Severe.	Discrete, Mild.	Discrete, Very mild.	Discrete.	Very Mild.	Slight.	Total.
Vaccinated within 12 days of onset of disease .. ..	..	3	3	1	..	3	..	1	11
Vaccinated at 7 years .. ..	..	..	..	..	..	..	1	..	1
Vaccinated in infancy	2	..	2	1	3	7	1	1	17
Never vaccinated	6	1	6	1	1	4	..	..	19
	8	4	11	3	4	14	2	2	48

That is, of those that had a severe attack—23 in number—13, or 56 per cent., had never been vaccinated, while 4, or 17 per cent., had been vaccinated in infancy. The six who were vaccinated within the incubation period were vaccinated—two on the seventh day of incubation, and four on the tenth day of incubation; so that it is obvious that the vaccination in these cases could not modify the severity of the attack. Of those who had only mild attacks—25 in number—4 per cent. were vaccinated at seven years of age, 52 per cent. in infancy, and 24 per cent. were never vaccinated.

To express the same facts another way—

The one patient vaccinated at seven years of age had only a mild attack.

Of seventeen patients who had been vaccinated in infancy four, or 23·5 per cent., had a severe attack, while thirteen, or 76·4 per cent., had a mild attack only.

Of those nineteen patients who had never been vaccinated thirteen, or 68·4 per cent., had a severe attack, while six, or 31·6 per cent., had a mild attack only.

It will be noticed that vaccination in infancy just about reversed the percentages that were experienced amongst the unvaccinated.

1888.

On 31st March, 1888, a case of confluent small-pox in a child, aged two years, was reported at Manly, a suburb of Sydney. The child died on 6th April, and the medical man in attendance was fined for not reporting the case as small-pox.—(*Australasian Medical Gazette*, April-May, 1888, and *Ann. Rep. S. A. Central Board Health*, 1888-9, p. 14).

This is a curious case, for there is no other case recorded in that year, or indeed since 1885, in either official reports or in contemporary unofficial literature.

1892.

The introduction of small-pox by the R.M.S. *Oroya* in 1892 led to the occurrence of three cases of small-pox among the resident population of

Sydney. One of the passengers by the *Oroya* (M. T., see p. 96) developed small-pox after leaving the vessel, and the fact of the existence of the disease was concealed for four or five days. During this period three persons—one in each of three different families—were infected by M. T. These patients and their households were isolated, and with these cases the spread of the infection was arrested.

1893.

The report of Central Board of Health of Victoria for the years 1892-5 contains the following statement (page 17): "In October, 1893, and for some time afterwards, Intercolonial vessels arriving from Sydney were subjected to medical inspection on arrival here, owing to the occurrence of a case of small-pox in the port of Sydney."

The *Australasian Medical Gazette* has a remark which doubtless refers to this case (October, 1893, p. 388): "A woman residing at Darlinghurst (Sydney) was found to be suffering from small-pox on 25th October."

The occurrence of this case was reported to the Victorian Board of Health by the New South Wales authorities, but there were no details given, and the only fresh fact was that announced by the Chairman that no fresh cases had occurred up to 31st October.

Dr. Ashburton Thompson has been kind enough to supply me with a copy of his report to the Board on this case, and also to inform me that "no further cases occurred, no source of infection was discovered, and that photographs taken at the time showed that the case was certainly one of small-pox."

Dr. Thompson's report contained the following information:—

The patient was a single girl, *æt* 25, vaccinated in infancy. She was a native of Goulburn (N.S.W.), where she had lived until about six months previously. She then went to 290 Victoria-street, and lived there until the time of her attack. Has had no acquaintance with persons connected with ships, nor has knowingly seen any one who has lately arrived oversea. Although nine persons were considered to be contacts and were isolated, no further case occurred, and no source of infection was discovered.

1901.

The s.s. *Euryalus* arrived on 8th March from Calcutta, and landed a passenger who, four days after the arrival of the boat developed small-pox and subsequently transmitted the disease to his relatives at his home at Leichhardt. No recognized cases of the disease had occurred on board the *Euryalus* during the voyage from Calcutta, but one of the passengers was alleged to have had an illness which was no doubt a mild attack of small-pox.

The troopship *Chingtu* from China arrived in Sydney on 27th April. Seven cases occurred among the *Chingtu's* passengers after her arrival in port. In connexion with the *Chingtu* outbreak two attacks of small-pox occurred on shore—one at Surry Hills, a suburb of Sydney, and the other at North Sydney. The latter proved fatal. (Report of the Medical Officer of Health for Metropolitan District of Sydney for 1901, p. 10).

There only remain to be discussed the number of deaths in each of the years as given in the returns of the Registrar-General.

I am greatly indebted to Mr. Trivett, Registrar-General for New South Wales, for furnishing me with these figures.

The years in which deaths from small-pox were registered in New South Wales, and the number of deaths in each year, are as follow :—

						Males.		Females.
1881	..	..	..	..	..	8	..	8
1882	..	..	..	..	..	12	..	7
1884	..	..	..	..	..	2	..	1
1885	..	..	..	..	..	1	..	1
1887	..	..	..	..	..	8	..	5
1888	..	..	..	..	..	1	..	1
1892	..	..	..	..	..	1		
1894	..	..	..	..	..	1		
1910	..	..	..	..	..	1		

The single deaths that occurred in the years 1892, 1894, 1910, were cases at the Quarantine Station from the vessels *Oroya*, *Taiyuan*, and *Otway* respectively.

The thirteen cases in 1887 were connected with the mail steamer *Preussen*. One of the cases in 1888 was the case at Manly, and the other was probably connected with a vessel in quarantine.

In no years other than the above were deaths from small-pox registered.

The foregoing facts represent all the information which has been discovered concerning the existence of small-pox among the white population of New South Wales. It is greatly to be regretted that this information is so incomplete, but from the facts that have been recorded it appears clear that apart from scattered cases there have been three distinct periods when the disease assumed epidemic prevalence, namely: 1877, 1881-2, 1884-5.

As has been pointed out in the discussion of the conditions, the occurrence of isolated cases during the time when small-pox was declared officially to be non-existent almost forces the observer to the conclusion that the disease had not been eradicated on 19th February, 1882, but that it remained in some way latent during the intervening period, and when some factor as yet undetermined provided the necessary condition it again assumed epidemic prevalence in 1884. The appearance of cases in 1887 and 1893 for the occurrence of which no satisfactory explanation is forthcoming leaves the student of epidemiology unsatisfied, for the official accounts of the epidemics are very far from being complete. This phase of the subject will be discussed in connexion with the occurrence of small-pox in other States during the same period, but it seems to be almost justifiable to assume that small-pox existed endemically in Sydney from 1881 to 1888.

Introduction of the Disease.

There is no evidence indicating the source from which the disease was introduced first in 1881. Although the first case discovered was in the house of a Chinese, yet it would not be legitimate to conclude that the Asiatic residents of Sydney were those amongst whom the disease first appeared. The records state that it is probable that there were other cases, and therefore no light is thrown on the question from that side. There is another fact which is not without interest in this connexion, that is that small-pox was during 1881 unusually prevalent in London.—(*Australian Medical Journal*, p. 311, and also table quoted from Creighton on p. 110).

The absence of definite information is unsatisfactory, and prevents any exact conclusion.

That the first half of the decade 1880-1890 was characterized by the somewhat extensive distribution of small-pox over Australia will be discussed at greater length elsewhere. It will be opportune at this point to raise the question "to what extent was the presence of the disease in Sydney responsible for its presence elsewhere?"

One would be quite justified in expecting that the epidemic occurrence of a disease among a large population which had hitherto been, practically speaking, free from the disease would reveal facts of fundamental importance in connexion with the epidemiology of the disease, and yet whether it be the barrenness of the records, or the sterility of the epidemics as regards instructive lessons, these extensive outbreaks of the disease have revealed only two or three facts. It may, of course, be that these are the essential, and, conceivably, the only essential facts which clearly emerge from the data provided, but in any case they are of fundamental importance, and they may be briefly stated as follows:—

- (1) The disease throughout displayed a low attack rate.
- (2) The very prominent position which must be accorded to direct personal contact as one of the principal, if not the controlling factor, in the spread of the disease.
- (3) The very definite absence of any indication of any other factor.

Dr. Ashburton Thompson, in an address before the Royal Society of New South Wales (*see Transactions, 1887, p. 230*), in discussing the 1881-2 epidemic, expresses these propositions in the following way:—

To some casual local spread of contagious disease two conditions alone are necessary, viz.: the presence of the specific contagium, and of personal and local susceptibility. Against epidemics of small-pox thus arising (I speak now of shore populations), our limited quarantine, or policy of isolation with vaccination, is doubtless a sufficient protection usually, that is to say—when members of the quarantine service are themselves also rendered invulnerable by vaccination and re-vaccination. But to pandemic extensions of disease, at all events, and probably therefore to any wide and uncontrollable spread even in a particular city, a third condition is necessary. What this is, is not yet known, although it may fairly be supposed to consist in conditions which prolong the life of the contagion after it has parted from the animal body in which it was propagated. But its existence may be inferred from the observation that whereas small-pox is endemic in many places, yet it becomes formidable only from time to time.

Now, if such accessions of virulence were merely local, they might be accounted for by accumulation of susceptible persons, newly born for the most part since the last preceding outbreak, when the then susceptible either got immunity after suffering, or were killed off. But it is not in isolated spots that such accessions are observed as a rule; on the contrary, many widely separated places begin to suffer about the same time, and hence it must be concluded that a third, not local, condition is necessary to them.

This being so, if we have hitherto escaped any serious epidemic of small-pox here, clearly that is because the third condition has never coincided with the other two. For we exhibit a full measure of personal susceptibility, since, as I calculate, there are at present in this city alone, at least 100,000 unvaccinated persons, reckoning only those who are under 20 years of age; while the specific contagion has often been introduced, and must continue to be introduced from time to time in the future, in spite of the greatest possible watchfulness at quarantine, and in spite of the arrest of all but a very few undiscoverable cases. The outbreak of 1881 seems to me a conspicuous example of the absence of the third condition, for though there were then in the city, I reckon, not less than 23,400 unvaccinated children under 5 years of age alone, and although the contagium remained alive and active for about eight months, yet no more than 154 persons are known to have suffered out of a population of about 228,000.

(Dr. Thompson then reviews the salient features of the epidemic as these have already been detailed above).

All these circumstances being considered together, it becomes clear that the contagium showed very little activity, and that almost all the cases must have been due to contact either with the sick themselves or with fomites; at all events, its aerial diffusion was so slight as to be negligible. And, as a matter of recorded observation, of 103 cases which happened after 2nd September, when note of the source of infection first began to be taken, 70 per cent. were found to have been infected either by contact with the sick, or by fomites, or by close contiguity of the sick in an adjoining house—a large proportion to be thus traced in a crowded city.

Lastly, although communication was easy and remained uninterrupted, there was no spread of the disease to other cities or to the country districts.

While these remarks were made by Dr. Thompson only in connexion with the epidemic of 1881-2, yet they are equally true of the later epidemics. The fact that immediate personal contact had occurred in practically every case in which the details are recorded in 1884-5 outbreak, brings into prominence this apparent necessity for personal contact before infection can occur, and it would appear to be almost justifiable to question whether infection had occurred in these outbreaks in the absence of direct personal contact. Particularly is this feature produced in the later occasion of the introduction of small-pox by steamers in 1892 and 1901. In these years vessels arrived in Sydney with the infection on board, and this infection of small-pox was for one or another reason enabled to attack the resident population of Sydney, but in no single instance was the range of active infection greater than the immediate neighbourhood of foci of infection directly from the ship.

CHAPTER IV.

SMALL-POX IN VICTORIA AFTER 1850.

THE FIRST EPIDEMIC, 1857.

The first recorded epidemic amongst Europeans in Victoria occurred in 1857, being directly introduced by the ship *Commodore Perry*. This vessel sailed from Liverpool in May, 1857, with 680 passengers on board, calling at Bahia on 16th July, and arriving at Port Phillip Heads on 12th September. During the voyage, four deaths had occurred, which were reported to the Health Officer on his boarding the vessel at the Heads, and stated to have arisen from the following causes, viz.: in two cases debility, in one case marasmus, and in one case disease of the brain. Satisfactory answers having been given to the other questions of the Health Officer, the vessel was allowed to proceed to Hobson's Bay. Nothing whatever was known of small-pox until the appearance of the disease in Melbourne, but during the inquiries that were made to ascertain if the disease had been introduced by the *Commodore Perry*, it was discovered that a sailor had been lying on board sick of small-pox since the 29th September.

The three people in whom the disease first made its appearance were all passengers in the ship *Commodore Perry* and only a short interval elapsed between their landing and the manifestation of the disease.

The first case was reported on 28th September in the person of a child aged 1 year, in Lonsdale-street, Melbourne. The second case, reported the same day, was his brother, aged 5 years, and the third, reported 29th September, a man, aged 27, also living in Melbourne.

These three were all, as has been said, passengers on the *Commodore Perry*, and the dates of the reports, allowing for the passage up the bay, the incubation period, and the inevitable lapse of time before medical advice was sought and a diagnosis established, was consistent with the hypothesis of infection derived from some focus on board the *Commodore Perry*.

On 15th October, *i.e.*, eighteen days after the notification of the first case, two further cases were reported. These occurred at Gisborne, one being a European and the other an aboriginal boy. The source of infection in these two cases is not entirely established. The medical attendant assigned the cause of the attack to the fact that "McLean (the European patient) slept in a hut with Robert Mackie—one of the passengers of the *Commodore Perry*, for a few nights previous to 2nd October, the aboriginal boy (Mickie) sleeping in the loft above." There is no record of the man Mackie having been attacked by the disease, either previously or subsequently, and while it is possible that he may have been in some way infectious, it is, on the other hand, stated that "a large number of the passengers of the *Commodore Perry* were at this time engaged on some works in the neighbourhood of Gisborne."

The measures of isolation adopted with these two cases prevented any further spread of the disease at Gisborne. The subsequent cases all occurred in Melbourne, the first three of these occurring in the immediate neighbourhood of the locality where the disease first made its appearance.

Sixteen cases in all occurred, including those above-mentioned, the last being reported on 24th December. There are no facts stated in the report, from which any opinion as to the source of infection in any of the later cases in Melbourne can be formed. Of these sixteen there was a fatal result in four cases.

The attitude of some of the individuals concerned and of some of the medical men is indicated by the facts that, owing to the refusal of some of the parents to allow their children to be isolated, it was necessary to issue a special proclamation placing the particular premises in quarantine; and owing to the refusal of one medical man to give any particulars to the Board of Health about the cases he was attending, it was necessary to rapidly pass a special Act making notification of all cases of small-pox by any person to whose knowledge such cases might come, compulsory. This attitude on the part of individuals is in very marked contrast to the panic that would occur under similar circumstances to-day. The measures adopted were very widespread vaccination, complete isolation, and such disinfection as could be carried out. It is interesting to note the reference by the Central Board, in its Report, to the "very general disregard of the provisions of the Vaccination Act."

Vaccination.—The table shows that amongst six people not protected by vaccination, two died, three had a severe attack, and one a mild attack. Of those nine who are recorded as being vaccinated, and, therefore, presumably more or less protected, two died, three had severe attacks, and four had mild attacks.

The case entered as "vaccination doubtful" is excluded. The percentages then are as follows:—

			Died.		Severe.		Mild.
Unvaccinated	..	..	33·3	..	50	..	16·7
Vaccinated	..	..	22·2	..	33·3	..	44·4

These statistics, although the facts upon which they are based are very imperfect, show decidedly the value of vaccination. The cost of the epidemic is officially stated as £771 6s. 1d. There are in the records of this outbreak no facts upon which the method of spread of the infection can be based except those given above.

In the Fourth Annual Report (for 1858) of the Central Board of Health, Victoria, appears the following statement:—

During the past year (1858) we received several reports of the appearance of small-pox in the neighbourhood of Melbourne; but on examination most of the cases proved to be "varicella" or "chicken-pox"—a disease prevalent in Melbourne both before and since the 1857 outbreak of small-pox, and in others the persons were found to be merely suffering from cutaneous eruptions.

The continual confusion between small-pox and chicken-pox, which was the most striking characteristic of the history of small-pox in Victoria, raises the question of the exact identity of these cases.

It is, however, idle to speculate, and as speculation is the only possible method of discussing this hypothesis, it is as well to be content with recording the known facts.

CASES AT GEELONG, 1866.

The following is quoted *verbatim* from the *Australian Medical Journal*. There can hardly be any doubt that the cases described were cases of small-

pox. In fact, Dr. Day, speaking three years after the occasion, says of the third case that "the third, though umbilicated, was not varicella—a further degree would have constituted it variola."

VARICELLA AT GEELONG.

(Extract from the *Australian Medical Journal*, 1866, p. 287).

The following letter from Dr. Day, relative to the recent occurrence of varicella at Geelong, and which was reported to be variola, was intended to be read at the last meeting of the Medical Society, but the lateness of the hour at which the ordinary business terminated prevented this being done. Dr. Day kindly forwarded with his communication three photographs, which show the locality and extent of the eruption:—

My Dear Sir,—There has been a good deal of excitement in Geelong during the last few weeks, in consequence of rumours that several cases of small-pox had occurred at a house in Ashby, one of the suburbs. The cases were three in number, and occurred in the following order:—First—Mary T., *æt* 2 years, was sick and feverish three or four days before the eruption appeared; about the third day the vesicles became flattened and umbilicated, and on the sixth day the suppurative stage was established. In about a fortnight from the commencement of the eruption, the disease had run its course, leaving behind a good many scars, particularly on the face and back. In this case there was no sore throat, nor was there any great constitutional disturbance. There was no secondary fever.

Case 2.—Mary T., *æt* 3 years, vaccinated. A vesicular eruption appeared on 5th August; had been rather feverish and poorly for a day or two before the eruption presented itself. This was a clear case of vesicular varicella. The disease ran its usual course without the occurrence of anything worthy of remark.

Case 3.—David T., *æt* 3 months, not vaccinated. Pimples first seen on 24th August; had been cross and peevish during the previous 48 hours. The spots first appeared on the back, and on the following day on the face; in about three days it had spread over the whole body. The papule became vesiculae on the third day, and by the fifth day were depressed in their centre. They then ran on to the suppurative stage and desiccation commenced on the eighth day. This child was by far the greatest sufferer from the disease. There were several pustules in the throat, which made it very hoarse, and there was a slight amount of secondary fever.

In all these cases the eruption commenced on the back and chest, and not on the face as it usually does in small-pox.

The medical man who attended these cases pronounced them to be genuine small-pox, and very properly requested the Government Medical Officer to see them. The chief medical officer was communicated with on the subject, and after a few days he came down and personally examined the patients. I believe he pronounced the disease to be chicken-pox.

Being on terms of friendship with the medical attendant of the above cases, I was asked to give my opinion, which was rather opposed to that entertained by my friend. I believe case No. 1 to have been umbilicated pustular varicella; No. 2, vesicular varicella; No. 3, a severe form of umbilicated pustular varicella.

Yours very truly,

John Day.

Yarra-street, Geelong, 4/9/1866.

Dr. Day wrote again to the *Australian Medical Journal*, on 12th September, 1866, on the same subject—

My Dear Sir,—I hope you will not consider me a terrible bore. I must, however, run that risk for the sake of telling you a little more about the cases which had been diagnosed as small-pox in Ashby by my friend, Mr. Howell. On the 2nd inst., I inoculated the ear of an Italian greyhound with a little of the fluid taken with a *new* lancet from one of the pustules on the unvaccinated child—the one who had the eruption in a very severe form. For the first six days there was no appearance of irritation about the spot inoculated. On the seventh day the cuticle was slightly raised and a little ear fluid was oozing out; there was no distinct vesicle. On the ninth day there was a well-defined pustule which on the following day looked as if it had been broken by scratching or rubbing. This day (12th September) there is still a circular scab to be seen.

These cases having occurred so soon after the arrival of the *Tornado* with small-pox on board, are, I consider, in this epidemic period, by no means devoid of interest.

Yours very truly,

John Day.

Three years later, when taking part in a discussion at the Medical Society on small-pox at the time of the epidemic in 1869, Dr. Day spoke as follows:—

Dr. Day referred to the introduction of what was considered variola at Geelong, some time ago, but which was pronounced to be varicella by Dr. McCrae. On carefully reflecting upon the matter, he had concluded that the first was umbilicated varicella, the second vesicular varicella, and the third though umbilicated yet not varicella, inasmuch as it began on the shoulders and spread slowly to the face. A further degree, however, would, he thought, have constituted it variola. During the nineteen years he had lived in Geelong he had known two distinct epidemics of pustular varicella, and he thought it possible that the conditions in this Colony were not favorable for the development of true variola.—(Extract from *Australian Medical Journal*, 1869, p. 57).

There is, however, no evidence of the source of infection in these cases. Dr. Day tentatively suggests the *Tornado*, and a consideration of the facts connected with this vessel render this hypothesis a not improbable one (p. 82). The cases occurred in Geelong during August, 1866, and the *Tornado* had arrived at Port Phillip Heads on 20th July, then she landed seven persons at the Quarantine Station suffering from small-pox. On the fifth day, after an inspection had revealed that all on board were well, the vessel and all on board were released. There is no evidence that any care was exercised to see that no person was incubating the disease or that each person released had been vaccinated.

THE SECOND EPIDEMIC, 1868-9.

The second recorded outbreak in Victoria commenced in the latter part of the year 1868, and continued into the early part of the year 1869. The first few cases were confined to the poorer parts of Melbourne. There followed then a localized outbreak in one of the nearer country districts, and the last of the cases occurred in the suburbs near Melbourne. Two single cases occurred in the remote country districts—one at Tarnagulla, and the other at Walhalla. The first case was reported on the 27th November, 1868, and the last case on 9th May, 1869.

Origin of the Outbreak.—There are some difficulties in the way of determining finally the origin of all the cases in this epidemic.

The table (*see* p. 38) gives such details as are recorded of each of the cases, in the order in which they were notified. It is compiled from the information contained in Dr. McCrae's report, which is to be found in an Appendix to the Annual Report of the Victorian Central Board of Health, 1871. From this and the other official reports by Dr. McCrae, the whole of the information relative to this 1869 epidemic is taken.

The first case officially recognized was that of a man named Webster, who was mate of the barque *Avonvale*. This vessel arrived at Port Phillip Heads on 21st November, and on the 23rd, Webster was ill enough to be sent to the Melbourne Hospital (the eruption appeared on the 24th), so that it is clear his infection is to be referred to the ship. The *Avonvale* had come from Foo-chow-foo, having called at Anjer on her way, and during the voyage two deaths had occurred. Dr. McCrae, as a result of his inquiries, came to the conclusion that "one of these had most probably died of small-pox."

Webster was placed in a small isolation room at the Melbourne Hospital opening off a general ward. There was in this isolation room only one other patient—a man well advanced in the terminal stages of pulmonary tuberculosis. This man was infected by Webster and showed the eruption of small-pox on 14th December (Case No. 2.)

These two cases were removed to the Immigration Hospital—No. 1, on 27th November; and No. 2, on 14th December. The Immigration Hospital was retained in use until 19th January, on which date all the patients isolated there were removed to a special building at Royal Park.

Between 27th November and 19th January, *i.e.*, the period during which the Immigration Hospital was in use, eight further cases occurred—all within 300 yards of the hospital, and after the removal of all the patients to Royal Park, no further cases were reported in this, an exceptionally insanitary locality. The exact mode of transmission of the infection will be presently discussed, but it is probable that the first ten cases, at any rate, were directly due to the original introduction by the man Webster from infection brought by the *Arnavale*.

Among these ten there was one case (No. 4) whose home was in Greensborough, 13 miles from Melbourne, but who had spent some time, stated to have been "about half-an-hour," at the house of No. 3, close to the Immigration Hospital, on 1st December.*

From this one boy (Case 4), there were infected seventeen others in Greensborough and district. There can be no doubt whatever of the connexion between this first case and the subsequent seventeen others. Six of them were members of the same family (the L. family) as the original case 4; four of them were members of another family (the M. family), residing 80 yards from the L. family; three of them lived 400 yards from the L. and M. families; one had been visiting the L. family a fortnight prior to his attack.

The mate of the *Arnavale* can, therefore, be said to have been responsible for the first 27 cases of the outbreak. The remaining sixteen occurred in widely scattered parts of the suburbs, from St. Kilda to Hotham and Collingwood, and there appears from the records, to be no evidence of the source of infection in these cases. These latter sixteen cases may of course have been due to spread from the other notified cases, either directly or through the medium of unrecognized cases; on the other hand, they may have been merely cases occurring as part of a succession of unrecognized cases which had been going on for some years, and on this hypothesis might themselves have escaped recognition had it not been that attention was drawn forcibly to the subject of small-pox. At this date (after the lapse of 42 years) it is impossible to say. All that can be said with any degree of probability is that the *Arnavale* was directly responsible for the first 27 cases recorded.

Method of spread of the infection.—In the eighteen cases at Greensborough, it was clear that direct personal contact, with consequent direct spread from person to person, was the controlling factor. A consideration of the dates upon which these cases showed themselves is sufficient evidence to justify this conclusion. The eruption in the infecting case (No. 4) appeared on 13th December. On 26th December (*i.e.*, exactly thirteen days later) cases 11, 12, and 17 (the infecting focus for the M. family) became ill. In the case of No. 17, the eruption appeared on 29th December, and No. 18 became ill on 10th January (thirteen days later). The eruption appeared in the cases of Nos. 11 and 12 on the 29th December, and on 10th January (thirteen days later), Nos. 15 and 16 became ill.

* The boy is stated to have become ill on the 10th December, which would allow an incubation period of only nine days, but it would seem to be reasonable to assume a certain amount of inaccuracy in the dates, especially as they appear to have been ascertained only on 19th January.

Among those cases arising subsequently to the Greensborough outbreak definite personal contact can be traced in only a few cases. No. 32 was a brother of No. 31. No. 35 lived two doors away from, and is supposed to have visited No. 32. No. 40 nursed No. 33 and wore some of his clothes after his death. No. 43 was the fifth and last of a series of cases to which considerable importance attaches. The following extract from the report deals with this case :—

This last case, J. S. (Case 43), it appeared on inquiry was the fifth of a series. About two months previously a cousin of this child, 3½ years old, who had good marks of previous vaccination, and who was living in the neighbourhood and in frequent communication with the family, was taken ill with languor and heaviness for two days, followed by vesicular eruption, which came out in successive crops all over it and which lasted about a fortnight, and then disappeared, the child never having been confined to bed. A fortnight after this, the sister of this child, 6½ years old, previously vaccinated, was taken ill : after two or three days of malaise a vesicular eruption came out, sparsely on the face, trunk, and limbs, the thorax being also affected. The eruption lasted eight days, and then gradually disappeared. The child was not confined to bed. A fortnight after this case, namely, on the 9th of April, a girl, J. S., aged 12½ years, sister of the child who died (Case 43), and cousin of the two last-mentioned children was taken ill ; after two or three days' illness an eruption like that of scarlatina appeared, and on the 12th several vesicles came out on the abdomen. The child had been well vaccinated in infancy. The case was seen by a private medical practitioner and pronounced by him to be one of varicella. The girl soon got well.

A fortnight after this, namely, on the 25th April, George S., aged 19, the brother of the preceding, was taken ill with headache, fever, and delirium. He had been vaccinated in infancy, and had tolerably good marks. On the 29th, a scarlet rash appeared on the skin, and on the 30th a vesicular eruption came out on the face, neck, and upper extremities. The disease lasted a fortnight, and he was confined to bed for ten days. No medical man saw the case, his parents thinking it was the same disease which in his sister the doctor had pronounced to be varicella.

It is therefore clear not only that this case (No. 43) was directly due to personal contact, but that there were four cases—all of them mild—which were undoubtedly small-pox but which escaped recognition. The question again arises, "How many of such cases were there in Melbourne and suburbs, and to what extent were they responsible for the latter group of cases in Melbourne?" It is noteworthy that the epidemic in the metropolitan area divides itself into two periods, which are quite distinct :—

- (1) 27th November–19th January, during which time all the cases came from the neighbourhood of the Immigration Hospital, and no case was reported except in this region (the Greensborough cases of course excepted). At no time after the transfer of the patients from the hospital was any case reported from this neighbourhood.
- (2) 18th February–9th May, during which the neighbourhood of the Immigration Hospital was free, but cases arose at very divergent points through the suburbs having no apparent connexion with each other.

In the absence of any exact information, the existence of a widely spread epidemic of mild cases of small-pox, can only be hypothetical. It is a tempting enough theory, but, while admitting the possibility, it must be concluded that there is not sufficient evidence to justify any assertion of its existence. Certainly the case of the German, detailed by Dr. McCrae (*see* p. 34) is not without significance, and the series above described points in the same direction ; but the position must be summed up by the statement that as

regards the second period of the epidemic there is no evidence from which the method of spread of infection can be deduced.

There remains for consideration the first group of eight cases which occurred in the neighbourhood of the Immigration Hospital and subsequent to the admission to that hospital of the first two cases.

The patients (Nos. 1 and 2) entered the hospital on 27th November, and on 10th December (thirteen days later) the first two of the secondary group became ill. It is a puzzling fact that neither of these two cases lived near the hospital, and though each had visited the same house quite near the hospital, the date of the visit is stated in one case as 1st December and in the other as 3rd December, and previous visits within several weeks are denied. The next case (No. 5) lived in "a right-of-way at the back of the Immigration Hospital, and the yards of the houses in this lane were bounded on their southern extremities by the wall of the yard of the hospital." The next case (No. 6) lived 300 yards away and "had never been nearer the hospital than her own dwelling for several months prior to her illness. On the other hand, it is stated that the matron of the Immigration Depot (nearly half a mile away from the Immigration Hospital) had visited her (No. 6) exactly a fortnight previous to the appearance of the eruption. Of the other three, there is little to say. No. 8 was brother of No. 5 and developed the disease exactly thirteen days after No. 5. Nos. 9 and 10 lived 30 and 90 yards respectively from the hospital, and though there may be some significance in the fact that No. 10 developed the disease exactly thirteen days after No. 9, too much importance should not be attached to the fact.

The question at once arises, "Had this series of cases any connexion with the hospital or not?"

In the first place, attention must be called to the fact that for a very long time the most reliable medical men were divided amongst themselves as to the nature of the disease. Of eight medical men commissioned by the Chief Secretary to report upon the cases at the Immigration Hospital, three gave the diagnosis as small-pox, four, including Dr. McCrae, as chicken-pox, and one diagnosed some cases small-pox, some chicken-pox. Also a medical man with a large experience of small-pox was very decided in his opinion that all the Greensborough cases were chicken-pox, and this after he had made a very careful examination. Dr. McCrae, as the epidemic advanced, freely admitted that all the cases were small-pox, and there can be now no possible doubt that this was so.

These facts will have a significance in connexion with the following two extracts from the official reports:—

The Colony had been for years previous to the arrival of the *Avonvale* apparently free from small-pox (varicella, however, had been frequently prevalent, and some of the cases of that disease, when attacking adults, bore a remarkable resemblance to true small-pox).

For the last five months and long before the *Avonvale* arrived in the Colony, chicken-pox has been very prevalent and severe in Sandridge,* on board the penal hulk *Deborah* and in other places, and there is a greater amount of this disease now prevalent all over the Colony than has ever been known previously. The coincidence of these cases with those of varioloid, which have been detailed, is as remarkable here as it was in Philadelphia in 1823.

Therefore, the possibility that these cases had nothing whatever to do with the Immigration Hospital cases cannot be disregarded.

It becomes a question whether the *Aronvale* case was not merely an incident focussing attention on these unrecognised cases and without any casual relationship, except in respect of the first group of cases. The existence of the Geelong cases in 1866 is not without significance.

On the other hand, there is the very general conviction of those who investigated the cases at the time that, as expressed by Dr. McCrae—

“ . . . it is nearly as impossible to conclude that there was any other origin of the disease than the subject of the first case, namely, the mate of the *Aronvale*.”

There is also the fact that the outbreak in this locality coincided in point of locality and time with the use of the Immigration Hospital for these small-pox patients. It is impossible to disregard the significance of these, and the connexion between the two facts must be admitted.

Given, then, the fact that these eight cases were infected from cases 1 and 2, what was the mode of their infection? In the first place, the locality was described by the town clerk of Melbourne thus: “The hospital is adjacent to ‘Shamrock-alley,’ a place closely occupied by small tenements and densely populated by inhabitants of the poorer class,” and thus obviously offered the most favorable conditions for the spread of an infectious disease. Also, under the social conditions which universally belong to such a neighbourhood, there would be nothing surprising in freedom of intercourse with the hospital, or even in communication with the patients themselves, more especially as the disease was considered, even by the medical men, as chicken-pox, and a certain amount of visiting by friends doubtless occurred. On the whole, it is impossible after this lapse of time to do more than accept the conclusions of Dr. McCrae. He states that—

While in Greensborough each of the eighteen persons contracted the disease from contact with some previous case, in Melbourne the progress of the disease could not be similarly traced. Still, in a city and suburbs with a population of at least 140,000 inhabitants, constantly moving about among each other, the persons attacked might have been exposed to contagion without being able to trace its source. That this did occur is rendered probable by a fact that was afterwards discovered relating to the source of three of the cases, which at the time could not, after the minutest inquiry be connected in any way with each other. The two cases, Nos. 31 and 32, in whom the eruption appeared on the 9th and 11th March respectively, were brother and sister, the former living in Latrobe-street East, and the latter in Hotham, a mile distant, but occasionally visiting her mother's house in Latrobe-street, where her brother lived. The subject of Case 35 had also been living in Latrobe-street, within two doors of the subject of Case 31. Now, long afterwards, it came to my knowledge that a German, living in part of the same house with the boy (Case 31) had, about fourteen days previously to the boy's seizure, been laid up for four days in bed with a feverish attack, accompanied with an eruption of some pimples about the face and neck. When the boy was removed from the house on the 12th March, I actually vaccinated this man, his wife, and family, and they then denied that any of them had ever been affected with any eruption, but I have now no doubt that this German was the source from which the subjects of Cases 31, 32, and 35 imbibed the contagion.

This fact is sufficient to show that in a large city like Melbourne the disease might have been spread by contagion from cases that were either wilfully or ignorantly concealed.

The theory of air-borne infection is then carefully reviewed in the light of the facts, and Dr. McCrae's conclusion is—“It is impossible, in the face of these facts, to accept the conclusion that the disease of small-pox was disseminated on this occasion by contagion through the atmosphere.”

Then Dr. McCrae, not finding himself satisfied either with the "direct infection" or the "air-borne infection" hypothesis, turns to the fly-borne infection hypothesis for the explanation of the facts, not only in connexion with the cases in the first period, but also those in the metropolitan area throughout the epidemic.

He asks, "Could not the disease be conveyed by flies from the bodies of patients who were suffering from small-pox to others who were susceptible of it?" and proceeds to discuss this question, as follows:—

The hypothesis of the contagion having been conveyed by means of flies would account for the erratic manner in which the disease appeared in different localities; would meet the otherwise insuperable difficulty of the distance to which the infection was conveyed; would explain why persons situated near the focus of contagion escaped while others further off in the same direction were infected; and would remove the difficulty raised by the "period of incubation." I put it forward with some hesitation as the only one which, under the circumstances, is tenable and which will account for the course of the disease, but as one which must be left to future more extensive and minute observation to either adopt or reject. It is, at all events, remarkable, that after this idea struck me, and the flies in the Royal Park Hospital were in consequence destroyed, only four cases of the disease occurred, two of which—Nos. 40 and 43—were both traced to distinct previous contagion, while the other two cases—Nos. 41 and 42—were such doubtful ones, that, had small-pox not been prevalent in the Colony at the time, no one would have pronounced them to be variola.

This is, so far as can be ascertained, the first occasion on which fly convection has been officially put forward in Australia as the mode of spread of infectious diseases. The facts, however, would not seem, on critical examination, to lend any weight to the theory. Why flies should, starting their flight from the Royal Park, attack only one person in St. Kilda, one in South Yarra, one in Fitzroy, one in Richmond, two in Collingwood, and miss the rest of the population in these places, is difficult to understand. It would have been expected that the intensity of the incidence would have varied inversely with the distance from the hospital, and it is very doubtful whether a fly could travel nearly 4 miles from Royal Park to St. Kilda, even with a strong northerly wind.

The review of the evidence leads to little satisfaction as to the method of spread of the contagion, and it must be left undetermined. Inasmuch, however, as all the other Australian epidemics show very markedly the importance of personal contact, and as this was the controlling factor in the Greensborough group of cases, it is not unreasonable, in the absence of full evidence, to look with suspicion upon, and even doubt the necessity for, any other hypothesis.

This section should not be closed, however, without reference to Dr. McCrae's suggestion at one stage. "The conclusion seems to me irresistible that the disease has arisen from some atmospheric or telluric influences which has been epidemic for some months." This can hardly be considered very seriously, although it is interesting to note that the epidemic subsided soon after the first heavy fall of rain.

There was one instance where the recorded facts are in favour of spread by fomites—

Case 41.—This woman moved into the house in which No. 31 had resided, after the latter's removal to hospital. After a fortnight's residence in the house, the eruption of small-pox appeared.

Vaccination.—The degree of vaccination was recorded as accurately as the information available allowed. The following table gives the particulars :—

			Mild.		Severe.		Deaths.
Unvaccinated	..	..	1	..	..	..	2
Doubtful	..	..	1	..	..	..	2
Vaccinated infancy	..	..	21	..	1	..	3
Revaccinated	..	..	..	..	..	..	..
Not stated	..	..	7	..	2	..	3

Discarding the "not stated" and "doubtful" cases, the following comparison appears. Of unvaccinated persons attacked, 66 per cent. died; of persons vaccinated in infancy, 12 per cent. died, 4 per cent. were severe, and 84 per cent. mild. No revaccinated person was attacked. The three fatal cases amongst those who had been vaccinated in infancy were aged 12, 21, 23 years.

Dr. McCrae lays emphasis on the two facts brought out by this epidemic :—

Two facts of the greatest importance have been established during the course of this epidemic of varioloid disease: one is that primary vaccination does not protect any one beyond a certain period, which may be greater or less in different individuals, but which cannot be safely said to stand beyond ten years. The other fact is equally significant—it is that no person who has been properly revaccinated has taken the disease.

Course of the Epidemic.—From the first case to the last, the epidemic covered a period of almost six months. There are 43 cases officially recorded, although the report definitely recognises five others as unnotified cases of small-pox. That this does not represent the full number of cases that occurred is evident from the fact that a typical case, not officially recorded, is described in the *Australian Medical Journal*, 1869, p. 207. The number of deaths was 10, giving a mortality of 23·2 per cent. One of these cases (No. 2) was dying from pulmonary tuberculosis.

With the exception of one case at Tarnagulla, 117 miles from Melbourne, and Wallhalla, 106 miles, and the Greensborough group of cases, the epidemic was confined to the metropolitan area, and of these cases it is probable that the Tarnagulla case was infected from the metropolitan area direct, while the Wallhalla patient had left Melbourne a few days before becoming ill.*

No one of the suburbs was especially affected, the suburban distribution being as follows :—

Hotham	..	..	..	..	3 cases
Collingwood	..	..	..	..	2 „
Fitzroy	..	..	..	..	1 case
South Yarra	..	..	..	..	2 cases
Carlton	..	..	..	..	1 case
St. Kilda	..	..	..	..	1 „
Richmond	..	..	..	..	1 „

Several instances of failure of the disease to spread occurred during the course of the outbreak :—

1. Although Webster was in a room at the Melbourne Hospital opening off a general ward, the only person affected was case No. 2, who was in the same small room with Webster.

* Dr. McCrae, however, stated in 1873, this case "appeared without any means of explanation as to its appearance at Wallhalla."—(*Australian Medical Journal*, 1873. p. 79.)

2. Case No. 36.—The brother of this case, aged 18, who had not previously been vaccinated, and another young man, aged 20, who had been vaccinated, slept in the same room with case 36 for two nights after the eruption appeared on the latter, but did not take the disease.

Case 38 had an unvaccinated infant, who did not take the disease, although the man was not removed from his home.

The means adopted for suppressing the disease were: 1st, isolation of the patients, either by removal or by compulsory prevention of intercourse between the inhabitants of the infected house and the neighbouring dwellings; 2nd, disinfection of the house and all the clothes, bedding, and furniture in it; 3rd, house to house vaccination of the neighbours; 4th, cleansing, disinfection, and, when necessary, paving and draining the streets and channels in the neighbourhood of the infected houses; 5th, provision for the nursing and medical treatment of such as were not able to procure medical aid; 6th, re-vaccination of the inmates of all industrial schools, gaols, penal establishments, as well as the soldiers and the police; 7th, recommending the immediate vaccination of all children and adults not previously vaccinated, and the revaccination of all persons not revaccinated within the last ten years.

The total cost of the epidemic was stated in the Legislative Assembly to have been £330 (*Australian Medical Journal*, 1869, p. 194). This seems to be a very small amount, but must be accepted as the official pronouncement, although it is possible that large items, *e.g.*, building of wards, &c., may have been charged to the cost of other public departments.

TABLE D.—CASES OFFICIALLY RECORDED DURING THE VICTORIAN EPIDEMIC OF 1868-9.

No.	Initials.	Date of first Symptoms	Date of Notification.	Degree of Vaccination.	Age and Sex.	Result.	Address.	
1	— W. ..	21.11.68	27.11.68	.. ..	M., adult ..	Died 3.12.68, severe	<i>Aconale</i> ..	Mate of ship <i>Aconale</i>
2	W. J. B.	14.12.68	14.12.68	Unsuccessful revaccination, 27.11.68	.. ..	Died from phthisis 15.12.68; attack mild	.. ..	Patient at Melbourne Hospital in same room with No. 1
3	..	10.12.68	17.12.68	Marks of previous vaccination	F., 17 ..	Mild, recovered	Right-of-way, off Little-Bourke street	Was employed at East Melbourne, but visited her family at the address given on 3rd December. House was 110 yards from Immigration Hospital
4	H. L. ..	10.12.68	23.12.68	Vaccinated in infancy	M., 16 ..	Mild, recovered	Greensborough, 13 miles from Melbourne	On 1st December spent "half-an-hour" at house given above as address of No. 3
5	..	19.12.68	..	Vaccinated in infancy	F., 30 ..	Moderate, recovered	Right-of-way, back of Immigration Hospital	Proximity to Immigration Hospital
6	..	20.12.68	..	Vaccinated in childhood	.. ..	Mild, recovered	300 yards from Immigration Hospital	Proximity to Immigration Hospital
7	..	27.12.68	..	Vaccinated in infancy	M., 17 ..	Severe, recovered	Shamrock-lane, 30 yards from Immigration Hospital	Proximity to Immigration Hospital
8	..	1.1.69	..	Vaccinated in childhood	M., 28 ..	Mild, recovered	Shamrock-lane ..	Brother of No. 5
9	..	3.1.69	..	Vaccinated in infancy	F., 50 ..	Moderate, recovered	30 yards from Immigration Hospital	Proximity to hospital
10	— D. ..	16.1.69	..	Vaccinated in infancy; re-vaccinated week before onset	F., 30 ..	Mild, recovered	90 yards from Immigration Hospital	Proximity to hospital
11	J. L. ..	26.12.68	..	Not stated	M., 40 ..	Very mild	Greensborough ..	Father of No. 4
12	J. L. ..	26.12.68	..	Vaccinated in infancy	M., 7 ..	Very mild	Greensborough ..	Brother of No. 4

TABLE D.—CASES OFFICIALLY RECORDED DURING THE VICTORIAN EPIDEMIC OF 1868-9—*continued*.

No.	Initials.	Date of First Symptoms	Date of Notification.	Degree of Vaccination.	Age and Sex.	Result.	Address.	—
13	M. A. L.	Not stated	..	Not stated	F., 5	Very mild	Greensborough	Sister of No. 4
14	S. L.	2.1.69	..	Not stated	F., 2	Very mild, recovered	Greensborough	Sister of No. 4
15	E. L.	10.1.69	..	..	F., 9	Very mild, recovered	Greensborough	Sister of No. 4
16	Mrs. L.	10.1.69	..	..	F., —	Very mild, recovered	Greensborough	Sister of No. 4
17	G. M.	26.12.68 eruption 29th	..	..	M., 10	Very mild, recovered	Greensborough, 80 yards from L. family	From L. family
18	H. M.	10.1.69	..	..	M., 30	Very mild, recovered	Greensborough	Brother of G. M., No. 17
19	C. M.	16.1.69	..	Never vaccinated	F., 8 months	Very mild	Greensborough	Daughter of No. 18
20	Mrs. M.	Not stated	..	..	F., 22	Very mild	Greensborough	Wife of No. 18
21	Mrs. W.	12.1.69	..	..	F., 28	Severe	Greensborough	Lives about 400 yards from L's, and s. families
22	..	21.1.69	25.1.69	Vaccinated in-fancy	M., 30	Mild	Diamond Creek	Had visited house of L's, family, about a fortnight previous to attack
23	— R.	24.1.69	..	Not stated	M., 40	Severe, died 1.2.69	Greensborough	Not stated
24	— W.	24.1.69	..	Unvaccinated	—, 10 days	Severe, died 1.2.69	Greensborough	Infant of No. 21. Born during its mother's attack. Eruption appeared on the eleventh day after birth (14.1.69)
25	— C.	1.2.69	..	Vaccinated in-fancy	F., 55	Mild, recovered	Greensborough	Mother of No. 21. Nursed No. 21 during her illness
26	— R.	8.1.69	..	Vaccinated in-fancy, unsuccessful, revaccinated	F., 35	Recovery	Greensborough	Wife of case 23
27	— R.	8.1.69	..	..	..	Mild, recovery	Greensborough	Child of cases 23 and 26
28	W. U.	About 29.1.69	13.2.69	Vaccinated 4 months previously	M., 1½	Mild, recovery	Laanecoorie	Sister of patient who resided at Brunswick-street, Fitzroy; arrived Laanecoorie about 1.1.69, and left again about three weeks prior to 13th February.

TABLE D.—CASES OFFICIALLY RECORDED DURING THE VICTORIAN EPIDEMIC OF 1868-9—*continued*.

Initials.	Date of First Symptoms.	Date of Notification.	Degree of Vaccination.	Age and Sex.	Result.	Address.	—
29 ..	18.2.69	..	Vaccinated in-fancy	M., 32	Moderate, recovered	Fitzroy ..	Unsettled
30 P. E. ..	25.2.69	..	Unvaccinated	M., 50	Severe, died 6.3.69	Collins-street, Melbourne	Unknown
31 Mrs. D.	6.3.69	12.3.69	Vaccinated in-fancy	F., 23	Mild, recovered	Hotham ..	Unknown
32 J. D. ..	8.3.69	..	Vaccinated in-fancy	M., 12	Severe, died 20.3.69	La Trobe-street, Melbourne	Brother of case No. 31
33 — G. ..	9.3.69	13.3.69	Vaccinated in-fancy	M., 29	Died 16.3.69	Punt Hill, South Yarra	Unknown*
34 R. W. H.	11.3.69	15.3.69	Vaccinated in-fancy	M., 33	Mild, recovered	Richmond ..	Unknown
35 Mrs. H.	12.3.69	..	Not stated	F., 21	Severe, died 23.3.69	Walhalla ..	Removed from La Trobe-street, two doors from No. 32 just before she became ill
36 W. H. ..	14.3.69	19.3.69	Vaccinated in-childhood	M., 23	Severe, died 27.3.69	Rathdown-street, Carlton	Unknown
37 — O. ..	28.3.69	..	Vaccinated in-fancy	M., 30	Mild, recovered	Islington-street, Collingwood	Unknown
38 — F. ..	29.3.69	..	? Vaccinated in-fancy	M., 26	Mild, recovered	Burld-street, Collingwood	Unknown
39 M. M. ..	30.3.69	5.4.69	Vaccinated in-fancy	F., 25	Mild, recovered	St. Kilda ..	Unknown
40 — E. ..	2.4.69	7.4.69	Previously had small-pox	F., 25	Very severe, recovered	Punt Hill, South Yarra	Nurse to No. 33, and wore some of No. 33's clothes, after his death, without disinfection
41 — E. ..	..	..	Vaccinated in-fancy	F., 32	Mild, recovered	Queensberry-street, Hotham	Lived in house whence case 31 had been removed to hospital, and eruption appeared after a fortnight's residence
42 — J. ..	11.4.69	..	Vaccinated in-childhood	F., adult	Mild, recovered	Baillie-street, Hotham	Unknown
43 J. S. ..	9.5.69	..	? Vaccinated in-fancy	F., 4	Severe, died 24.5.69	..	Contracted from other cases, <i>see</i> letterpress

* See also *Australian Medical Journal*, May, 1892, p. 213, at discussion on the Southon case—

.. It long remained a mystery how this gentleman came in contact with the disease, but at last a satisfactory explanation was obtained." (There is no statement as to the nature of the explanation.)

THE THIRD EPIDEMIC, BENDIGO, 1872.

The third outbreak in Victoria occurred in Sandhurst (now Bendigo), in 1872. On 4th July of that year it was reported to the Health Officer of that city that four children in one family (named James), at Long Gully, $2\frac{1}{2}$ miles from Sandhurst, were ill with small-pox, and that a fifth had died on 22nd June. The child that had died was the first of the series, and the other children affected were M. J., 6 years old, said to have been vaccinated, but bearing no good vaccination scars; G. J., 15 months old, unvaccinated; E. J., 9 years old, unvaccinated. Of these three children, one died on the morning of 5th July, but if does not appear from the records which of these children it was. There was also a child, S. S., aged 9 years, living in the same house but of another family, who was attacked at the same time as the three mentioned.

There had been one of the children in this, (the James) family, ill on board the ship *Nebraska*, with an eruption; and also, after reaching Sandhurst, an adult young man had an attack "so slight as not to be noticed."

There had then at this stage been—

1. The child ill on the *Nebraska*;
2. The child who died on 22nd June, and whose death was registered as "varicella";
3. The "adult young man";
4. M. J., aged 6 years;
5. G. J., aged 15 months;
6. E. J., aged 9 years;
7. S. S., aged 9 years;
8. On 5th July, a further case was discovered in the person of a woman who was known to have visited the James family "about a fortnight previously," and who lived only 40 or 50 yards from that family;
9. A young man, living at Eaglehawk, 4 miles from Sandhurst, was reported on 8th July. This man was working in the same mining claim with case 3, which was so mild as to escape notice. Although isolation and disinfection were definitely delayed, yet no other case occurred in the borough of Eaglehawk;
10. A young man, living in Sandhurst, reported on 22nd July. No other case was infected from this man. He was infected through working on the same mining claim as case 3.

This was the last case that occurred. Several cases resembling small-pox were subsequently reported and promptly examined, but were found to be other diseases.

There were in all 10 cases, of which three—all James children—terminated fatally.

The chain of infection is strikingly complete: The first James child was infected on the *Nebraska*, then the rest of the family were attacked. The woman, case 8, had been visiting the James family. Cases 9 and 10 had been working in the closest possible contact with the "adult young man with the very mild attack."

The movements of the J. family prior to the commencement of the epidemic are as follows:—They had been resident in Long Gully for a period of about

five weeks, having arrived in Melbourne on 4th June, and proceeded to Sandhurst next day. Nine days after arrival at Sandhurst the first child became ill, and died on the 22nd June, so that it had been ill eight days. Before going to Long Gully they had spent one day in Melbourne on their way from the ship *Hero*. They had come originally from San Francisco, which port they had left on the 24th April, in the *Nebraska*, calling at Honolulu, and exchanging into the *Hero* at Auckland. They did not go ashore at Auckland, although they were in the *Hero* for three days prior to her departure. From Auckland the vessel came to Melbourne, having called at Sydney. There is a certain amount of evidence to show that the *Nebraska* was an infected ship, for telegrams were received at Melbourne on 8th July, announcing the occurrence of small-pox at Honolulu and Auckland, brought obviously by the *Nebraska*, and at Sydney, on board the *Hero*, which had brought the *Nebraska* passengers on from Auckland. Later information showed that on the 4th of July small-pox was raging at Honolulu, there having been up to that date 38 cases of small-pox, with four deaths. The chain of evidence incriminating the *Nebraska* is, therefore, fairly complete, the second of the J. children to be attacked (case 2) having sickened about ten days after leaving the *Hero*, and the first report of the disease among the other J. children was twelve days after the death of this first case.

It is interesting to notice that the death of this first case was certified as being due to varicella, a mistake almost invariably made at the commencement of small-pox epidemics.

(The S. family had been in Long Gully for ten months, and showed no symptoms of the disease prior to the arrival of the J. family).

Although other passengers by the *Nebraska* were found to be living in Long Gully, they showed no symptoms of the disease, and two other children, one in Carlton, and one in Little-Bourke-street, Melbourne, also passengers by the *Nebraska*, reported to be suffering from small-pox, were found to be suffering only from slight feverishness.

The S. family and the J. family, consisting of eight children and six adults, lived together in the same house, the total dimensions of which were 20 feet by 20 feet, and which contained four rooms.

The measures which were successful in bringing the epidemic to an end were the isolation of the patients, the vaccination of every person not successfully vaccinated within the previous ten years, and "the disinfection of houses, yards, drains, cesspools, premises, and bedding and clothing."

An interesting sidelight on certain phases of human nature was afforded during this epidemic by the fact that the person who first announced to the police the occurrence of small-pox was continually having his windows and roof broken by large stones. The total expenditure in Sandhurst in connexion with this epidemic is officially stated to have been £919.—(C.B.H. Annual Report, 1872.)

The account of this epidemic would not be complete without a description of the circumstances surrounding the occurrence of a case of small-pox which was discovered on the s.s. *Hero*, at Newcastle, New South Wales, on 6th July, 1872. A steerage passenger (J. S.) by this vessel showed the early stages of the rash the day after the arrival of the vessel at Newcastle. The patient died on 13th July, after a typical attack of small-pox. This man

was a passenger from Auckland, New Zealand, and he stated that "a short time previously, he believes on 24th June, he dined in an eating-house in Auckland where the man who has since died of small-pox had dined.* Seven days afterwards he became ill and the rash appeared on the twelfth day. This period of incubation is too short, but though the doubt as to the actual date of exposure to infection must remain, yet the fact of such exposure would seem to be acceptable.

The patient had never been vaccinated.

This is another case for which the *Nebraska* must be held to be responsible.

It is an interesting fact that although the vessel arrived at Newcastle on 5th July, and "as soon as possible after her arrival she was hauled alongside the wharf, and several passengers landed, some at once proceeding to Sydney by the evening boat, while others went up country *viâ* Maitland," yet no further cases are reported from any part of New South Wales. The first known cases subsequent to this event were the case in Newcastle, in 1874, and the small outbreak in Sydney in 1877.

Dr. McCrae's summary of this epidemic is very well worth quoting—

There is no doubt that the fact of the outbreak of this highly contagious disease having occurred during the winter season was a circumstance of great importance in facilitating the measures that were taken to stamp it out. The first cases were a week old before their true nature was perceived, and had the season been summer, instead of winter, the myriads of flies which exist at that season would doubtless have spread the disease to a much greater extent than it did actually spread. The few yards that separated the houses of the sick from those of the neighbouring inhabitants seemed to be quite sufficient for isolation, as none but those who came in actual contact with the cases were attacked by the disease. In this instance the satisfactory result of revaccination that has been so prominent in England in preventing the nurses and persons coming into necessary contact with the cases from contracting the disease has shown its value here also, not one person who was revaccinated having taken the disease.—(*Annual Report of the Central Board of Health, Victoria, 1872, p. 20.*)

This summary may be commented upon by directing attention to the fact that out of the large number of people living in Bendigo and its neighbourhood only ten persons contracted the disease, and of these the first seven were all in the one family, or the one house, while each of the other three were repeatedly in close personal contact with infective members of the J. family.

This epidemic illustrates the predominant importance of close personal contact as the factor determining spread of small-pox. No other method of transmission of infection appears to have been operative in this epidemic.

A supposed case of small-pox occurred in 1879—

A case of varicella occurred in the Sandhurst Gaol on 3rd February, 1879, which was at first supposed to be variola. The difficulty of diagnosis was increased in consequence of the patient being a South Sea Islander.—(*Australian Medical Journal, February, 1879, p. 98.*)

SMALL-POX IN VICTORIA IN 1882.

The first case reported in this year was Miss Southon. This case gave rise to considerable discussion, the debate upon it occupying two full evening sessions of the Victorian Branch of the British Medical Association. Some—amongst whom were those who had seen the case—maintained that it was small-pox, while others—chiefly those who had not seen the case—maintained that it was chicken-pox. There can be no doubt now that the case was small-pox.

* *New South Wales Medical Gazette, 1873, 4, p. 347.*

The sequence of events which led up to this case are interesting. In January and February the passengers from the vessels *Garonne* and *Mirzapore* were in quarantine at Adelaide for small-pox. On 2nd February, the *Garonne* passengers were released, and on 23rd February, those of the *Mirzapore*.—(*Australian Medical Journal*, 1882, pp. 192, 254.) The doctor in charge at the Quarantine Station (Dr. O'L.) left the quarantine ground on 18th February. He frequently stayed at the Imperial Hotel (visiting Melbourne and other places at intervals during the period under consideration), and is said to have mixed freely with the public. On 20th or 27th March, both dates are given, *i.e.*, 30 or 37 days after Dr. O'L. left the Quarantine Station, a housemaid (Miss Q.) at the Imperial Hotel was taken very ill at the hotel with fearful pain in the back, and had to remain in bed for two days.* Then she went to a lodging-house and there developed an eruption of papules on the face. Miss Southon—an intimate friend—was already at this boarding-house, and occupied the same room as Miss Q. during the day. They went together to a doctor to have the spots examined, and remained together till 5th April, when Miss S. came to Melbourne. Miss Southon had stayed at the Imperial Hotel until 27th March. She left Adelaide by boat on 5th April, and arrived in Melbourne on 7th April. On 10th April she became ill with the initial symptoms—headache and general pains in the limbs—and thereafter developed a normal attack of small-pox.

As Miss Southon had left the Imperial Hotel on 27th March, it seems clear that she must have contracted the infection from Miss Q. rather than that they both contracted the disease from the same source. Of course the hypothesis of a common source cannot be ignored, but there appears to be no good reason for invoking it to explain Miss Southon's infection. The hypothesis that Miss Southon contracted the infection from Miss Q. rests upon the assumption that the latter was suffering from genuine small-pox. Upon this latter point there can be now no certainty. The following history is given by the doctor who attended Miss Q., and although it is not a characteristic description of small-pox, yet it is not inconsistent with a mild attack on a vaccinated person:—

On the evening of the 27th March I was consulted by E. Q. She wished me to prescribe for a cold; she had a cough, and febrile pains in the limbs; and said she had been ill for two or three days. She had a breaking-out round the mouth, herpes labialis, such as is common in simple colds. She called my attention to some other spots on the face, and appeared anxious about them lest they should be the eruption of small-pox. I examined the spots and found about four or five in all, one only of which was on the forehead, and the others on the cheeks. One spot was a complete vesicle, containing perfectly clear fluid, not showing any depression, and without any redness around it. Another was a ruptured vesicle which had completely collapsed. The remaining were papular spots which did not give the shot-like feeling on pressure characteristic of variola. There was no other eruption on any other part of the body. I came to the conclusion that she had a slight attack of chicken-pox, accompanied by catarrh, and prescribed some medicine, and gave her instructions to let me hear if she were not better. . . . (She recovered without further symptoms.)—(*Australian Medical Journal*, 1882, p. 258.)

Assuming that the case of Miss Q. was small-pox, the question arises "From what source did she contract her infection?"

On the one hand is the fact that Dr. O'L. had been in attendance upon small-pox patients at the Quarantine Station, and Miss Q. had attended to his room and clothes. The length of time between the time the doctor

* *Australian Medical Journal*, 1882, p. 256-347.

left the station and the onset of Miss Q.'s illness (viz., 37 days), together with the fact that the doctor does not appear to have infected any other person, make it probable that if the doctor was responsible, it was by the medium of some clothes which were not handled by Miss Q. until 25 days after Dr. O'L. left the Quarantine Station. It is, however, improbable that Dr. O'L. should have left the station without first assuring himself that any infected clothing was thoroughly disinfected.

On the other hand, there is the fact stated officially by Dr. Gosse, the President of the Central Board of Health in South Australia, that "at this time chicken-pox was prevalent in South Australia." This, combined with the fact that he maintained that Miss Q. was stated to have been affected with chicken-pox, makes one doubt whether, in the light of the fact that a case of genuine small-pox was presumably infected by Miss Q., there were not unrecognised cases of small-pox present in Adelaide at this time.

Again on this occasion, as has been repeatedly the experience in studying the history of small-pox in Australia, one is faced with the indications of unrecognised small-pox of a type mild enough to be confused with chicken-pox, and with the equally important fact that concerning cases of genuine small-pox it was stoutly maintained, even by medical men experienced in small-pox, that the cases were only chicken-pox.

Miss Southon is not known to have infected any cases in Victoria, and she was isolated until she was free from infection.

No other cases are officially reported in Victoria during the year 1882, but the following extracts from contemporary journals have a considerable significance :—

A case of alleged small-pox at Hamilton was reported to the Central Board of Health, Melbourne, on Saturday, 23rd September, 1882. All the local medical men, after examining the case, declared the disease to be true small-pox, and immediate steps were taken for the isolation of the patient. A tent was erected in the middle of the police paddock, 3 miles from the town, and the patient was removed thither during the evening.

Dr. Youl, President of the Central Board of Health, proceeded to Hamilton on the following Monday to investigate the case: he pronounced it to be one of chicken-pox of a most malignant type. However, the three local practitioners did not agree with Dr. Youl, and firmly adhered to their opinion that the case was one of true variola. In order to allay the apprehension of the public, the Government instructed Drs. Plummer and Wilson to visit the patient, and having done so, they telegraphed to the Government that after a careful consideration they arrived at the conclusion that the case is undoubtedly, variola, complicated and modified by other diseases, and that, although on the eighth day, pustules continued to develop, instead of fading, as they would do if it were chicken-pox.

Dr. Girdlestone, who examined the case at the request of the local medical men, is of the same opinion, but Dr. Youl still asserts that the case is one of chicken-pox.

The patient died on Saturday, 30th September. Dr. Valentine Browne, who had charge of the patient, states that he was suffering from hæmorrhagic variola, and that it was a well-marked case which could not be mistaken for anything else.

It is also stated that a little later the sister of the deceased was "suffering from herpes zoster."

The fees paid by the Government to the three doctors in this instance amounted to a total of £350.—(This account is taken from the *Australasian Medical Gazette*, 1882-3, p. 15 and p. 89).

Dr. Crooke, of Fitzroy, Victoria, reported to the Central Board of Health, on 15th May, 1882, that a boy, 5 years of age, living with his parents in Drummond-street, Carlton, had developed small-pox. The boy was taken ill on Friday, and, according to Dr. Crooke, the eruption appeared on the following day. The City Health Officer examined the patient, but decided the case was one of chicken-pox.—(*Australasian Medical Gazette*, 1882-3, p. 127.)

Chicken-pox has broken out at Walhalla, Numurkah, and McIvor in Victoria.—(*Australasian Medical Gazette*, 1882-3, p. 144.)

Information reached Melbourne on 20th September, 1882, that a case of small-pox had been discovered at Yackandandah. The Board also received a telegram from Dr. Rohner, of Benalla, that an infant 20 months old had been discovered to be suffering from a modified attack of variola, but both cases turned out to be merely chicken-pox.—(*Australasian Medical Gazette*, 1881-2, p. 31.)

In view of the uncertainty in the minds of many medical men and especially, it must be said, of the responsible officials as to the diagnosis between chicken-pox and small-pox, and also in view of the number of occasions on which an official diagnosis of chicken-pox was proved to be wrong, one would be almost justified in assuming that some, at least, of these reported cases of chicken-pox were true small-pox.

SMALL-POX IN MELBOURNE, 1884-5.

Small-pox appeared in Melbourne in April, 1884, and between that date and 30th April, 1885, there were reported to the Central Board of Health altogether 56 cases.

The record of this series of cases is very meagre, and is all contained in the annual report of the Central Board of Health, issued 1885, and short references in the *Australian Medical Journal* and *Australasian Medical Gazette* of that period.

Such details as would be necessary for the tracing of the infection and a clear understanding of the course of the epidemic are not given; the source of the infection being specified in a few of the cases only.

Source of the Epidemic.—In order to discuss this, three events must be described—

1. The R.M.S. *Rome* arrived in Melbourne on 14th April, 1884, with one case of small-pox on board. The vessel was placed in quarantine, and released on 22nd April. The single patient—a lady (E. K.)—was released on 30th April; the bulk of the passengers having been released two or three days previously.
2. On 1st June, a case (T. B.) was reported from Carlton, a suburb of Melbourne.
3. After her release the patient (E. K.) from the *Rome* went to stay with some friends (Rev. Macartney) at Caulfield. That was on 30th April, and on 14th June, a man (J. Freeman) was admitted to the Melbourne Hospital suffering from chicken-pox. J. F. was a brother of Mrs. R., who lived at Malvern, the next suburb to Caulfield. It subsequently transpired that Mrs. R., her son, and a little girl living in the same house had all suffered, early in June, from a disease then believed to be chicken-pox, although these cases had never been reported to the Central Board of Health. The official report (p. 38) describes the subsequent course of events as follows:—

There can now be no dispute whatever that Freeman's disease was true variola. It was communicated from him to another patient named Davis, in the hospital, to several medical students attending the wards, also to a wardman named W. Hardis, and to others before proper precautions as against the spread of small-pox were taken. The students, many of whom were living in lodgings, afforded so many foci of contagion in various parts of the town, and spread the disease in Carlton, Northcote, and many other places, consequently several months elapsed before it could be completely stamped out.

The report appears to take it for granted that the infection introduced by the *Rome* was responsible for the cases in the R. family, and consequently for the case of J. F., and the other cases directly (amounting to seven in all connected with the hospital) and indirectly infected by J. F. Although this assumption is fairly definitely visible in the report, there is little or no evidence given in support of it. The whole matter turns upon the connexion between E. K. (the *Rome* patient staying at Caulfield) and the R. family, living at Malvern. The report does not specify whether any intercourse occurred or was likely between the household in which E. K. was staying and that of the R. family, but in the published minutes of the Board of Health of Victoria appears the statement that J. F. had never been in the employ of Rev. Macartney and knew nothing about him.

It is worthy of notice that there is considerable distance between the two suburbs (2 miles). It is unlikely, however, that as E. K. was living in Caulfield from 30th April until early in June before the first known cases—the R. family—occurred, that the infection would remain dormant for 31 days, and then attack only one family. (The two R. children were attending the Malvern State school). But at this date, the real facts can only be guessed at, and from the evidence recorded, all that can be done is to state that the report appears to ascribe the origin of the epidemic to importation of contagion by the *Rome*, while at the same time, it will be sufficient at this juncture to point out that there are facts which, to say the least, render that hypothesis doubtful.

Admitting that it be true that the *Rome* was responsible, then there are nine of the reported cases definitely accounted for. There still remain 46 other cases (No. 2, T. B., will be discussed in the next paragraph) in which the infection was not adequately traced. Dr. Girdlestone, the Health Officer for the city of Melbourne, refers some at least of these cases to infection by the students (*see* quotation above), but he adduces no evidence in support of this contention, and does not indeed express himself with very great conviction.

It might be well to consider these four students in detail:—

M. M. saw J. F. for the first time on 14th June; on 25th June felt ill; rash appeared 27th; was isolated on 1st July.

F. D.—Ill 27th June; rash 30th June; isolated 3rd July.

L. F. S.—Ill 19th July; rash 21st July; isolated 24th July.

T. W.—No details; was isolated at home and treated by the family doctor.

In the three first of these cases, isolation did not commence until three days after the rash appeared, and the fact that L. F. S. was a “secondary case,” *i.e.*, did not contract his infection from the primary case in the hospital, and not until 45 days after the death of J. F., indicates the probability that infection was spread to a certain extent from the first two cases, and therefore possibly also from the third.

If now, the table (Table E) be considered, the dates will show that infection might easily have been continuous from one of the reported cases directly to another, at any rate as far down the series as number 53. After this case, which was isolated on 19th November, there is a blank until 6th January, when a case was reported from Castlemaine.

There is no evidence given in the official report from which the source of infection in this last case could be traced, but according to a note in the *Australian Medical Journal*, January, 1885, p. 48, "Dr. Shields, Government Medical Officer, visited the case and reported that the disease had probably been caught from a person recently from England."

At this point it must be noted that of the 56 cases, 50 occurred in the metropolitan district, either in Melbourne or in its near suburbs. Five occurred in Carlton, eight in Hotham, six in Richmond, five in Fitzroy, and seven in Collingwood.

Of the six cases which occurred in the country districts, three are known to have been infected in the metropolitan area, while there are no facts as to the source of infection recorded in the case of the other three.

The number of cases officially recorded during this epidemic was fifty-six, of which six terminated fatally.

That this is not the total number of cases which occurred is clear from the facts recorded, viz., that three cases occurred in the R. family at Malvern, while in discussing case No. 27, it is stated that "two or three younger members of the family had small-pox before No. 27, but in a mild form. Their cases were not recognised as small-pox till the elder sister took the disease."

The case, T. B., which was the second case in the series of those reported to the Central Board of Health, offered much difficulty from the point of view, both of diagnosis and of tracing the source of infection.

For some time it was held, especially by the Chairman of the Central Board of Health (Dr. Youl) that the case was one of chicken-pox. The Melbourne correspondent of the *Australasian Medical Gazette*, July, 1884, states that "Dr. Youl is of the opinion that the case is one of chicken-pox and that there are many like it."

The discussion as to the source of infection may well be given in the words of Dr. Girdlestone, Health Officer for the city of Melbourne.

18th February, 1885.

During the past year the contagion of small-pox was again introduced into the city, and it is remarkable that this occurred shortly after the release of a ship which had been quarantined with the disease on board.

It appeared in two different localities about the same time, both neighbourhoods having been previously visited by passengers from the infected ship. The history and possible course of the contagion may be described briefly as follows:—The steamer *Rome* arrived at the Heads, about the middle of April, and was there placed in quarantine, as one of the passengers (Miss Kermode) was suffering from small-pox.

On being released from quarantine, Miss Kermode went to live at the house of the Rev. H. B. Macartney, at Caulfield, while two of the other passengers—a Mr. Cameron and his servant—left Melbourne by the Tasmanian steamer *Flinders*, on 29th April, and were on board until the next day, when they arrived at Launceston. The servant travelled in the steerage of the *Flinders*.

The next appearance of the disease was in a man named Barker, a dealer in furs, who used to travel between Melbourne and Launceston for trade purposes. Barker's symptoms commenced on 23rd May, when he became very ill with pains in his back, head, and limbs; there was also severe vomiting. On the 25th, the eruption came out first on the forehead and face, and then spread over the body. I saw him on Sunday morning 1st June: he was then living at his home, 25 Barkly-street, Carlton. He was suffering from a severe attack of semi-confluent small-pox, well developed, at about the ninth to tenth day of the disease. The eruption covered the head, face, and body. I reported it immediately as a case of variola, which, in my opinion, would probably prove fatal. The patient was removed to the Sanatorium the same morning, and died of variola after a few days.

To trace the infection to its source we must remember that the usual period of incubation in small-pox is from twelve to fourteen days. As the disease first showed itself in Barker on the 23rd May, we may infer that he took the contagion either on the 9th, 10th,

or the 11th of the same month. I learned on board the *Flinders* that this steamer had left Launceston on the 9th, and reached Melbourne on the 10th May, and that Barker was a steerage passenger during this trip. He may therefore have contracted the disease at Launceston or in Melbourne, or on board the steamer, the same by the way, which Mr. Cameron and his servant had been in some nine days previously. We may certainly conclude that at the present day variola is the result of a previous contagion, and that in this particular case it was not conveyed through the air, but that it was adhering to some article which afterwards came into close contact with Barker's person, *e.g.* articles of clothing and furs are capable of holding and conveying contagion, and they may certainly retain that of small-pox for some weeks.

Now it is necessary to remark that the *Rome* and her passengers were at that time the nearest source, and it is not at all unlikely that the quarantine laws were evaded to some extent, and this may be said without making any reflection on the officer in charge, for any one who has been retained in or who has examined the Point Nepean station, must be aware of its insecurity as a place of quarantine. Persons in quarantine can readily pass clothing or other articles through the fence to their friends outside if they are desirous of doing so.

The other locality in which variola appeared was Malvern, which is near the Rev. H. B. Macartney's, at Caulfield, where Miss Kermode had gone to reside on her release from quarantine. Early in June a family named Richardson (at Malvern) was attacked, *viz.*, a little boy, his mother, and a little girl. The disease was then believed to be chicken-pox. A man named Freeman, brother to Mrs. Richardson, then took the same complaint, and, under the impression that it was only chicken-pox, he was sent to the Melbourne Hospital, and admitted on 14th June. There can be no doubt whatever that Freeman's disease was true variola. It was communicated from him to another patient in the hospital named Davis, to several medical students attending the wards, and to a wardman named Hardis, and to others before proper precautions as against the spread of small-pox were taken. The students, many of whom were living in lodgings, afforded so many foci of contagion in various parts of the town, and spread the disease in Carlton, Northcote, and many other places, consequently several months elapsed before it could be completely stamped out.

T. M. GIRDLESTONE,

Officer of Health, City of Melbourne.

The above account makes it clear that the deduction that the *Flinders* was responsible or that Barker obtained his infection anywhere but in either Launceston or Melbourne is not justified. As he quite obviously could not have obtained the infection from the Malvern cases, the only alternatives are that unrecognised infection was spreading from others among the *Rome* passengers, or that there were cases of small-pox in Melbourne or Launceston which had nothing whatever to do with the *Rome*. The former hypothesis is put out of court by the dates, and the latter hypothesis must remain as the probable one.

Some facts must be pointed out in this connexion. In the first place, there is no record of any cases having appeared amongst any of the *Rome*'s passengers, other than the patient who was ill on the arrival of the vessel at Melbourne. As the other passengers were detained in quarantine thirteen days only after the isolation of the patient, it is just possible, though unlikely, that cases may have arisen. The only certain fact at this date is that no such cases were recorded.

Further, the remarks in the official report of the outbreak in Launceston, in 1887, should not be overlooked. "All attempts to directly connect the first known case of the present outbreak with any precedent case, either here or in the other Colonies, have hitherto failed The first two notified cases had previously been notified (six days earlier) as being cases of measles."

Finally, there is the statement in the *Australasian Medical Gazette*, June, 1884, p. 213, that a telegram received from Launceston states that when Barker was in that city, chicken-pox was prevalent there.

It is not intended to assert that small-pox existed in Launceston in 1884, and that Barker received his infection there. There is too much uncertainty after so long an interval, but the continued recurrence of the disease in various States, and the consistent difficulty in ascertaining the source of infection, together with the invariable diagnosis of chicken-pox in the early cases of each epidemic, have a significance that cannot be lightly dismissed.

This whole outbreak, lasting as it did in Melbourne for eight months, must leave in the mind of any who study the meagre records now available, a feeling of considerable dissatisfaction.

It may be that the explanation is simple, as would be the case if the hypothesis of the direct responsibility of the *Rome* be accepted without question; but on the other hand, when the events concurrently happening in the other Colonies are recalled, more especially in the light of the cases reported in Victoria in 1882, the possibility of a widespread infection throughout Australia demands serious consideration.

The feeling that the official conception of this epidemic was not complete is intensified by subsequent reports. There is the following extract from the *Australasian Medical Gazette*, May, 1885, p. 202:—

On 19th April, it was reported to the Central Board of Health that a little girl living at Hotham, who was suspected to be suffering from small-pox, really had a modified form of that disease. She was not removed to the Sanatorium, but the premises were strictly quarantined, and all the inmates revaccinated. She had been attending a State school at Hotham up to the time of showing the eruption. Several other suspicious cases are reported from the same locality. Some days after receiving this information, the Central Board of Health requested Drs. Shields and Tweeddale to investigate the case and report on it. The gentlemen referred to, accompanied by Dr. Girdlestone, broke the quarantine and examined the patient, when they agreed that she was certainly not suffering from varioloid disease.

It must be remembered that Hotham was one of the districts most affected during the previous epidemic, which was reported by the Central Board of Health to have ended on 30th April, 1885, the last case in Hotham having been reported on 20th April. While it is quite likely that the scare produced by the epidemic would cause cases to be reported other than those of genuine small-pox, it is on the other hand open to question whether there were not associated with this epidemic many cases unrecognised by reason of their mildness.

This idea of the widespread distribution of the disease gains much support from the following extracts from the Minutes of the Victorian Board of Health for that period:—

11th May, 1882.—A case of chicken-pox is reported from near Heathcote. A supposed case of small-pox is reported from Seymour.

27th November, 1882.—Chicken-pox is reported to be epidemic at Simpson's Creek, Warrayure, Branzholme, Euroa, Dairy, Gipsy Village, Mount Hope Sawmills, Dunkeld, Moorooduc, Ross' Creek, Richmond, Vaughan.

11th July, 1884.—A supposed case of small-pox was reported from Buxton.

18th July, 1884.—The President (Dr. Youl) stated that in the Children's Hospitals in the suburbs, there were not simply dozens, but hundreds of cases of chicken-pox. . . . None of the cases could be traced to the *Rome*. From the way in which other cases had started in places widely apart, it would be necessary to admit that there was small-pox all through the Colony if it were shown that the patients were suffering from that disease.

When these statements by Dr. Youl are considered in the light of the diagnosis of "chicken-pox" by the same gentleman in a fatal case of hæmorrhagic variola (*see* p. 48), grave doubts of the accuracy of the diagnosis "chicken-pox" in these cases are permissible; and, the concluding

statement that "it would be necessary to admit that there was small-pox all through the Colony if it was shown that the patients were suffering from that disease," is staggering in view of the fact that it was ultimately freely admitted by all concerned that the patients were suffering from small-pox.

All of the essential details about the cases in this epidemic are given in the table hereunder (Table E.)

There is no very striking information contained in this table. There are certain of the cases, however, in which the spread of infection could be traced.

Vaccination.—The facts given are not complete enough or satisfactory enough to serve as a basis for any far-reaching deductions.

It is, however, clear that a number of the cases had been once vaccinated, so that the mere fact of vaccination at some period during life does not permanently prevent the onset of small-pox. There is evidence that in many cases the vaccination had been far from complete, so that it is necessary that, as well as being vaccinated, a person must be properly vaccinated to have a reliable protection against small-pox.

Case 49 is interesting as it is an example of how vaccination *after* infection by small-pox will so modify the course of the small-pox as to produce an abortive attack.

Table E.

Cases of small-pox in Victoria, as reported to the Central Board of Health, from 5th November, 1883, to 30th April, 1885 :—

- Case 1. E. K.—Female, adult. R.M.S. *Rome*. Discharged after sixteen days' detention at Quarantine Station. No other person on board was ill or developed small-pox. Recovered. Fell ill 14th April, 1884.
- „ 2. T. B.—Male, adult. Carlton. Fell ill 23rd May, 1884. Died after four days' illness. This is the man Barker (*see* p. 48).
- „ 3. M. B.—Female, adult. Carlton. Became ill 9th June. Wife of No. 2, whom she nursed throughout this illness. Recovered.
- „ 4. E. R.—Female, adult. Nurse at Sanatorium. Nursed No. 2; afterwards slept in same room with No. 3. Onset 13th June. Had had small-pox once before. Recovered.
- „ 5. M. M.—Male, adult. Student, Melbourne Hospital. Saw No. 6 for first time on 14th June. Onset 25th June. Patient had two vaccination marks. Recovered.
- „ 6. J. F.—Male, 33. Malvern. Onset with rash 9th June, rash fully developed 14th. Was vaccinated 28th June, but vaccination not successful. Recovered.
- „ 7. F. D.—Male, 18. Student, Melbourne Hospital. Onset 27th June. Three vaccination marks, not well defined. Severe attack. Recovery.
- „ 8. G. H.—Male, 59. Wardsman, Melbourne Hospital. Onset 1st July. No evidence vaccination. Recovered.
- „ 9. J. P.—Male, 32. Patient at Melbourne Hospital. Onset 11th July. Vaccinated. eleven days before attack. Mild attack. Recovered.
- „ 10. J. A. P.—Male, 24. Hotham. Onset 10th July. Recovered.
- „ 11. R. M.—Male, 15. Richmond. Onset 14th July. Four indistinct vaccination marks. Recovered.
- „ 12. H. W.—Male, adult
- „ 13. H. W.—Female, adult
- „ 14. C. J. W.—Male, infant
- } All one family. No. 14 died. Nos. 12 and 13 recovered.
- „ 15. L. F. S.—Male, 20. Carlton. Student, Melbourne Hospital. Onset 19th July. One fairly distinct vaccination mark. Recovered.
- „ 16. T. W.—Male, 20. Preston. Student, Melbourne Hospital. Recovered.
- „ 17. E. W.—Female, adult. Preston. Caught disease from nursing previous case. Recovery.
- „ 18. B. M.—Female, 13½. Richmond. Onset 27th July. No marks primary vaccination. Was revaccinated 22nd July. Recovery.
- „ 19. W. F.—Male, 21. Hotham. "No. 10 had been in this person's house, and no doubt No. 19 caught disease from that person." Recovered.

- Case 20. M. F.—Female, 6. Hotham. In same house as No. 19.
 „ 21. T. D.—Male, 16 } Elsternwick. All mild cases. No information as to
 „ 22. C. A. D.—Female, 14 } vaccination.
 „ 23. M. D.—Female, 6 }
 „ 24. C. C.—Male, adult } Traralgon. Mild cases.
 „ 25. E. C.—Infant }
 „ 26. S. M.—Male, 4. Richmond. “Four marks recent vaccination.” Recovery.
 „ 27. K. R.—Female, 14. Melbourne. “Two or three younger members of family
 had small-pox before No. 27, but in a mild form, probably in consequence of
 more recent vaccination. Their cases were not recognised as small-pox till
 elder sister took the disease.”
 „ 28. M. E. H.—Female, 3. Hotham. “Two good vaccination marks well defined.
 Very mild case.”
 „ 29. N. J.—Male, 50. Richmond. Onset 7th August. “Two primary vaccination
 marks, fairly large and well defined.” Recovered.
 „ 30. A. R.—Female, 36. Melbourne. Onset 9th August. One good primary
 vaccination mark; two marks from revaccination 3rd August. Recovered.
 „ 31. J. D.—Male, 6. Melbourne. Four good primary marks. Very mild case.
 „ 32. D. A.—Male, 27. Wyndham. Onset 6th August. One primary mark, not well
 defined. Recovered.
 „ 33. J. McC.—Male, adult. St. Arnaud. Had been in Melbourne within three weeks
 of onset. No evidence vaccination. Recovered.
 „ 34. G. K.—Female, adult. Collingwood. Onset 1st August. No sign vaccination.
 Fairly severe attack. Recovered.
 „ 35. J. K.—Male, 13. Collingwood. Onset 14th August. Four primary vaccination
 marks fairly defined; two recent marks. Very mild case.
 „ 36. H. S.—Female, adult. Ascot Vale. Onset 11th August. One indistinct mark
 vaccination. Recovered.
 „ 37. M. A. H.—Female, 36. Hotham. Onset 27th August. Recovered.
 „ 38. J. C.—Male, adult. Fitzroy. Family of cases Nos. 12, 13, and 14; lived two
 doors away. Vaccination doubtful. Fairly severe attack. Recovered.
 „ 39. M. S.—Female, 23. Fitzroy. Onset 27th August. Recovered.
 „ 40. S. H.—Male, 40. Hotham. Contracted disease from wife (No. 37). Onset 14th
 September. Vaccination doubtful. Very mild attack.
 „ 41. J. H.—Male, 53. Melbourne. Onset 1st October. Died 4th October. Patient
 was not previously in good health.
 „ 42. G. W.—Male, 27. Collingwood. Onset 26th September. Vaccinated in infancy;
 one mark. Fairly severe attack. Recovered.
 „ 43. W. A.—Male, 28. Melbourne. Onset 1st October. Died 9th October.
 „ 44. S. C. E.—Female, 25 } Same family. Had gone to Berwick from Melbourne
 „ 45. J. E.—Male, 28 } before the disease was detected. Both recovered.
 „ 46. A. T.—Female, 35. Richmond. Onset 30th September. Three primary vacci-
 nation marks. Recovered.
 „ 47. E. C.—Female, 43.—Richmond. Onset 30th September. Vaccinated several
 times unsuccessfully.
 A. T., case 46, was housekeeper to a man (K.) who was said to have had
 a slight attack himself which was not reported. He frequently visited his
 uncle's house, where he used to meet case 47.—(Minutes of Board of Health of
 Victoria).
 „ 48. A. C.—Female, 36. Carlton. Nursed case 46 and was vaccinated fifth day from
 contact. No primary vaccination. Mild attack. Recovery.
 „ 49. A. C.—Female, 5 months. Infant of 48. Vaccinated for first time same day as
 the mother. On the day of admission, 18th October, eruption on face and
 hands; next day over body in red papular spots; two days afterwards pustular
 on face. In a week scabs falling off. Discharged same day as mother. The
 child had been vaccinated just after the small-pox infection had got a start
 and the variolous eruption and the vaccine vesicles were running their course
 at the same time. Recovery.
 „ 50. J. G. S.—Female, adult } Collingwood. Mother and infant. Both died after
 „ 51. A. S.—Infant } three days illness.
 „ 52. A. H.—Female, 34. Collingwood. Vaccination doubtful. No marks found.
 Vaccinated unsuccessfully three days after contact. Very mild attack.
 „ 53. C. S.—Male, 50. Collingwood. Vaccinated infancy, three marks; fourth day
 after contact revaccinated unsuccessfully. Moderate attack.
 „ 54. G. A. P.—Male, adult. Castlemaine. Reported 5th January. Recovered.
 „ 55. M. M.—Male, 55. Hotham. Onset 16th January. Said to have been vacci-
 nated in two places 50 years previously.
 „ 56. L. P. R.—Female, child. Hotham. Reported 20th April. Recovered.

SUPPOSED OUTBREAK IN 1887.

On 26th March, 1887, an outbreak of small-pox was reported from Gordon, in the Ballarat (Victoria) district. Dr. Shields, who was sent by the Central Board of Health to examine the cases, diagnosed them as chicken-pox.

1895.

A case of small-pox occurred at West Melbourne in March, 1895, and it is stated on the authority of Dr. Gresswell* that the infection in this case was traced to articles landed from the steamship *Cloncurry*, after undergoing quarantine on account of small-pox in February of the same year.

The full account of the circumstances will be found on p. 100. This is the clearest instance recorded in which fomites, *i.e.*, infected articles, have been responsible for the introduction of small-pox into Australia.

There was only one person infected.

* See Report, Board Public Health, 1892-5, p. 18.

CHAPTER V.

SMALL-POX IN TASMANIA.

So far as the records available show, there was not a single case of small-pox in Tasmania (with the exception, of course, of those arriving on board ship or arising in quarantine) before 1887.

There are two authoritative statements from which the above assertion as to the freedom of Tasmania from small-pox is derived. Dr. E. S. Hall, in a paper on "Epidemic Diseases of Tasmania," which appeared in the *Transactions of the Epidemiological Society*, 1863 (Vol. II., Pt. I., p. 70), states as follows :—

Small-pox.—The first disease in the miasmatic order of the zymotic class is happily so far unknown in Tasmania. Nevertheless, ships with passengers to this port have had deaths from this cause during the voyage, but it has never gained a footing in this island. Should it ever do so, a large proportion of the population will be in danger, for vaccination has been much neglected.

In 1870, Dr. Hall again brought his information up to date with the statement, "Small-pox has never yet existed in this island."—(*Australian Medical Journal*, 1870, p. 159.) Mr. A. Mault, in a report upon the 1887 epidemic of Launceston, states as follows :—

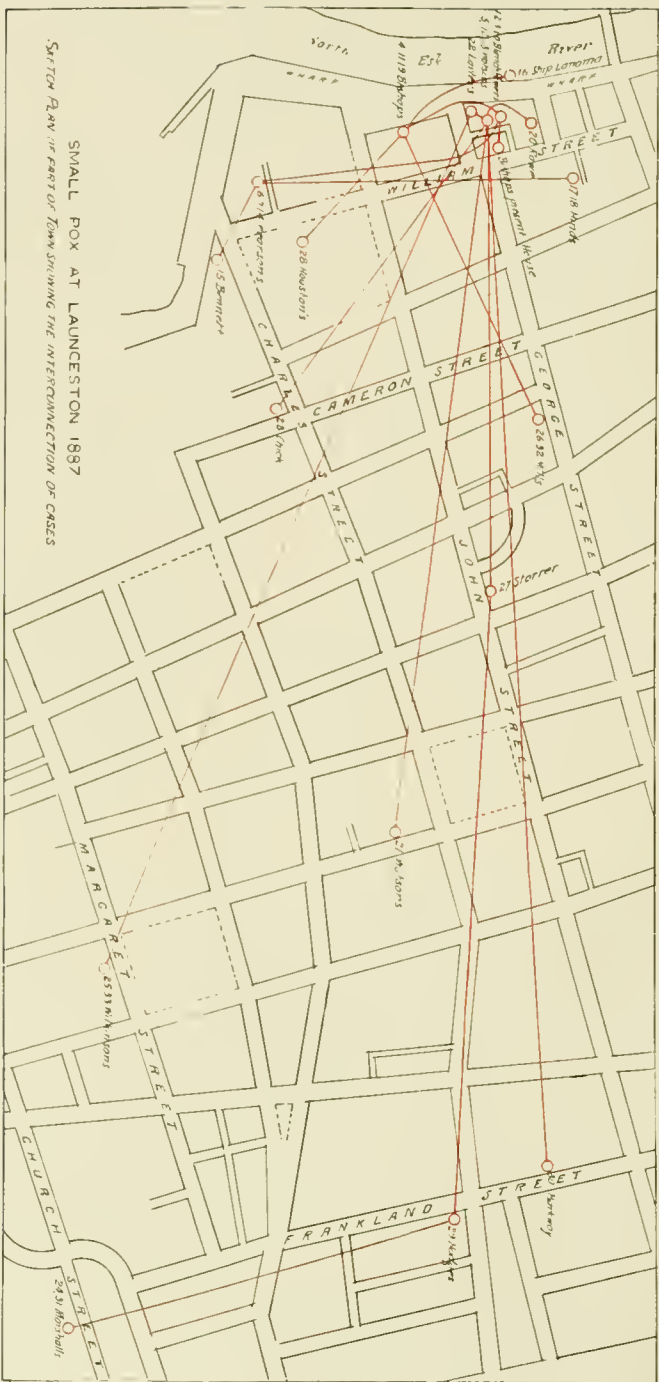
Since the adoption in 1869 of a system of registration specifying the cause of death, no death from small-pox has been recorded in Tasmania; nor does there appear to be any evidence that the disease had occurred in the island before the present outbreak of it.

It appears, therefore, from these two statements, made by reliable observers, that there was no outbreak of small-pox in Tasmania before 1887.

1887.

In that year an epidemic occurred in Launceston in which altogether 35 cases occurred, of which eleven were fatal. The earliest of the reported cases (Mrs. A. B.) appears, according to the official report by Mault, to have been infected about the 15th August. There is no evidence to show upon what date she first became ill, but she was reported to the Board of Health on the 23rd, and admitted to the hospital on the 27th in a state of convalescence. As is clearly shown in the report, the sequence of direct infection from this first case to all the subsequent ones, without exception, is easily traced; but it was found by Mault to be impossible to trace the infection prior to this first of the reported cases. It is noteworthy that many of the cases occurred in the region of the wharfs, but it is definitely stated that neither the patient herself (Mrs. A. B.) nor her husband had any remembrance of having at any previous time encountered any one who had the slightest appearance of having had small-pox.

Her father kept the Temperance Hotel on the wharf, and she often visited there, and may there have met some one who was unconsciously carrying the contagion, as such a person would be more probably met at the hotel than at her own house. But, as Mault says, "This is mere supposition."

[illegible]

The proximity of the centre of the outbreak to the wharfs would seem to render a direct introduction from overseas the most probable source of the epidemic, but whether Mrs. A. B. was infected from this source direct, or indeed from this source at all—some cases were, as appears to be common at the commencement of epidemics, allowed to pass undetected—is now purely a matter for speculation. Such speculation, however, is not without interest, especially when the facts that were available are so ably marshalled for our information by Mault:—

During the year there had been repeated importations of small-pox into other colonies from the outside world and from China, and though great precautions have been taken to confine the imported cases, and those subject to infection from them, within quarantine limits, the case of the *Port Victor* steam-ship showed that quarantine regulations cannot always be depended upon for excluding infection. The *Port Victor* arrived at Sydney from Singapore on the 20th or 21st June. There was then no sickness on board, nor any record of infectious disease during the voyage; the vessel was accordingly granted pratique, and some passengers were landed, and she sailed for Melbourne on the 25th June. On the 1st July small-pox showed itself in one of the passengers who had landed in Sydney, and intelligence of it was sent to the other colonies. In the meantime the *Port Victor* had arrived at Melbourne, and on the 30th June transhipped a number of Chinese passengers to the s.s. *Pateena*, for Launceston, where they arrived on the 1st July. These Chinese were all examined and kept under observation until all danger of development of small-pox was at an end. During their short stay in Launceston, it is not probable that they went to the house in which the first recorded case broke out; but the inmates of the house were in more or less direct communication with sea-faring people, and probably received the contagion of small-pox from some person or some article that had been in contact with the *Port Victor* case, just as the *Port Victor* passenger must have indirectly received the contagion. The *Port Victor* probably left Singapore, where small-pox is noarly, if not quite, endemic, between the 1st and the 5th of June; the passenger only showed small-pox on the 1st July, consequently he must have been infected after leaving Singapore, and the disease must have been transmitted intermediately to him. Furthermore, there were other sources from which the contagion might have been derived.

At the end of August and beginning of September there were cases of small-pox occurring at Sydney on board the Chinese steamer *Tsinan*, and persons and merchandise are continually arriving at Launceston from many other infected parts of the world. From all these considerations it may be safely said that the disease was imported into the town and was not a fresh development.

As has been mentioned elsewhere (p. 103), Dr. Ashburton Thompson showed that the Chinese from the vessel *Port Victor* were the last people to arrive at Launceston from an infected *milieu* before the commencement of the 1887 epidemic. No importance need however be attached to this fact, as Mault says they were sufficiently quarantined (Small-pox report) and that “they were all, however, found, and kept under strict observation until all danger of development of small-pox was past. And during the whole course of the subsequent outbreak no case occurred among the Chinese, nor was any case traceable to them.”—(*Central Board of Health, Tasmania, Annual Report for 1887*, p. 5.) The question inevitably arises, “What had this epidemic to do with the presence of small-pox in Sydney in the same year, when the relationship of the 1887 case in Sydney to the history of the previous years is considered? At this date nothing definite can be said.

Following on the first case, there were thirteen others in quick succession, all of which were admitted to the hospital on the 27th September. The fourteen cases all occurred in four houses, which were situated in the low-lying parts of Launceston, the floors being only 5 or 6 feet above ordinary high water. “Otherwise,” the report states, “they do not seem to have been specially unhealthy in condition.” The remaining nineteen cases were infected by methods which were, according to the report, “easily traced,

except in the case of number 21." The table given sets out such information as is available as to the precise method of infection in each case, and these facts are shown in the diagram reproduced.

The table shows very clearly that each case had come into direct personal contact with the person from whom he received his infection.

In all, there were 35 cases of small-pox, of which 33 occurred in Launceston; one directly connected with Launceston, and contracted there, occurred at the Don River; and one, which could not be traced, though from local circumstances evidently connected with Launceston, occurred at Evandale. Of these 35 cases, eleven, all in Launceston, were fatal, equal to 31·43 per cent. of the cases.

The occurrence of this case at the Don River has a certain significance in connexion with the following remark in the Annual Report of the Central Board of Health of South Australia, 1887-8, p. 12 :—

On 2nd October, 1887, the *Charles and Arthur* schooner, from New South Wales, *via* the Don River, in Tasmania, arrived at Glenelg, with a passenger on board who had suspicious signs of small-pox. The vessel was ordered into quarantine and kept there until a sufficient time had elapsed to diagnose the case with certainty. After the lapse of 21 days, and on receipt of a certificate from the Health Officer at Glenelg, the vessel was released.

The last case was admitted to the hospital on 28th October.

The story that has been over and over again repeated in Australia of failure to recognise the first cases was strikingly exemplified in this outbreak. The cases Nos. 5 and 6 were first notified (17th September) as being cases of measles, but were subsequently notified on 23rd September as cases of small-pox. The inquiries at once instituted led to the discovery of cases Nos. 1, 2, 3, and 4, amongst which was Mrs. A. B.

The occasion called forth strong comment by Mault, as follows :—

There is no need for me to record the universal regret that, owing to the neglect of those whose duty it was to give timely warning of the presence of so dread a disease amongst us, the contagion was allowed to spread unchecked, and people who would naturally have taken precautions if forewarned of the risk they were running were allowed to minister about the sick and carry the disease away with them to their own houses.

While the patients and contacts were being kept in hospital and quarantine at Mowbray, their houses in Launceston were isolated. Many other persons were also isolated in their own houses in the town as having had some communication with infected persons. In this latter category were the inhabitants of 27 houses. While too much attention cannot be paid to the separation of the sick from the healthy, I cannot help thinking that a great deal of useless precaution was taken in regard to isolation. After the first batch of thirteen cases had been sent to the hospital, eighteen fresh cases developed in the town, not one of which occurred in a house that had been previously isolated as a matter of precaution.

The measures taken were those taken in other epidemics, consisting principally in isolation of patients and contacts, disinfection of premises and ordinary domestic articles, and vaccination of contacts and others who desired vaccination. With regard to vaccination, Mault says in his report :—

The experience here but tallies with that of every other part of the world as to its protective power against small-pox. After so convincing a proof given in our own midst, a grave responsibility will be incurred if vaccination be allowed to be neglected as in the past.

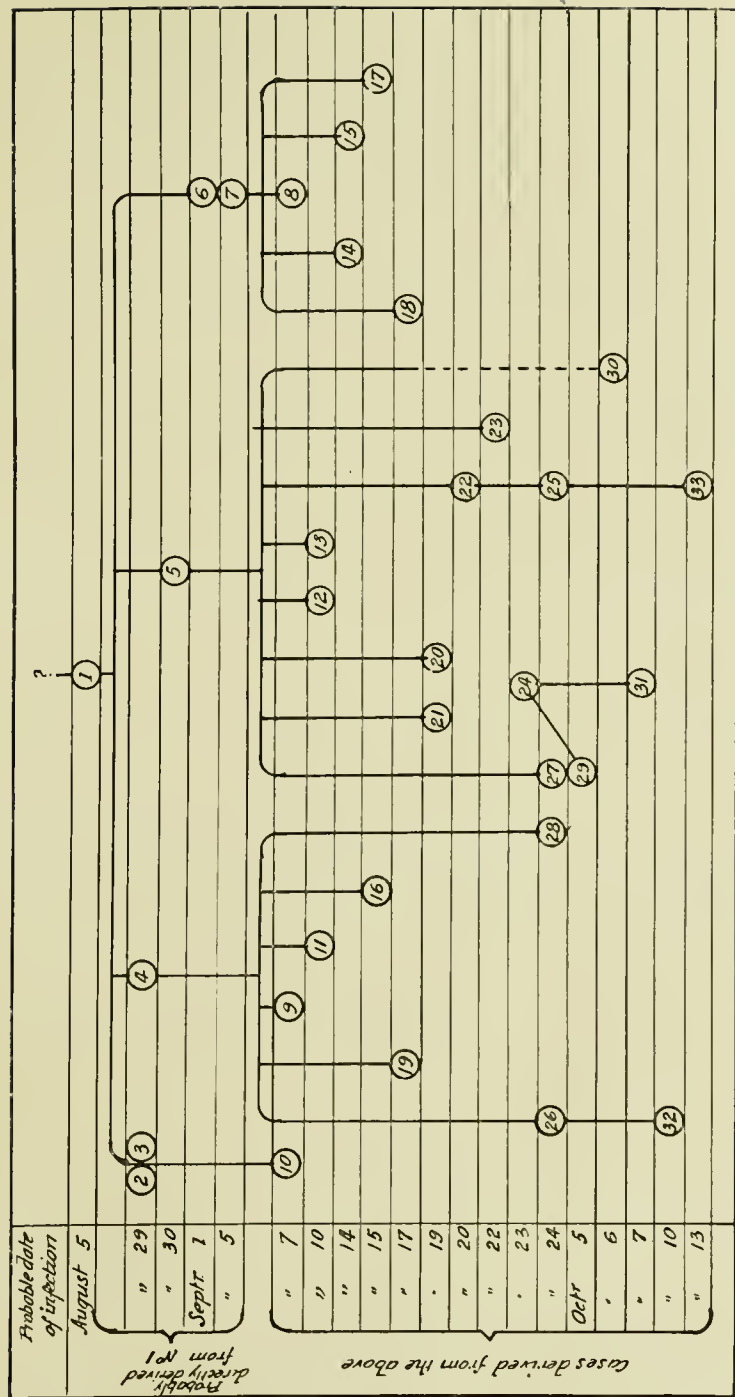


Figure I.—Sequence of Cases in Launceston Epidemic of 1887.

Mault discusses the effect of vaccination in this epidemic:—

Of the 33 cases, ten were persons who had been vaccinated in infancy, one of whom died; four of persons who had been vaccinated and revaccinated after childhood, none of whom died; sixteen were of persons who had never been vaccinated, of whom seven died; and three were of persons whose record was doubtful, but who bore no marks of ever having been vaccinated, all of whom died. Thus of cases of—

persons who had been vaccinated in infancy, 10 per cent. died;
 persons who had been vaccinated after childhood, 0 per cent. died;
 persons who had never been vaccinated, 43 per cent. died;
 persons who bore no marks of ever having been vaccinated, 100 per cent. died.

Or of—

persons who had certainly been vaccinated, 7 per cent. died;
 persons who actually or virtually were not vaccinated, 52 per cent. died.

In regard to the single case of death among the vaccinated patients, it should be mentioned that the man was otherwise unhealthy, and his vaccination dated back more than 40 years.

There are no means in Tasmania of satisfactorily estimating the relative numbers of vaccinated and unvaccinated persons, but of the 76 people above mentioned (being the 72 admitted to the Mowbray establishment—both patients and contacts—and the four cases treated in Launceston), information as to vaccination had been furnished of 74, the number of vaccinated being 45 and of unvaccinated and unmarked 29. Of the 45 vaccinated, 25 were vaccinated in infancy and 20 in after life. Taking 74 as the number exposed to infection, it appears that—

of 25 people vaccinated in infancy, 10 developed the disease, being 40 per cent.;

of 20 people vaccinated in after life, none developed the disease;

of 29 unvaccinated people, 23 developed the disease, being 79 per cent.,

and it must be borne in mind that the six unvaccinated people who did not develop the disease were all vaccinated as soon as practicable after it was known that they had been exposed to infection.

The outbreak afforded another lamentable illustration of the neglect of the authorities to maintain a reserve supply of lymph for use in such an emergency as this. The following quotation from Mault's report is very striking:—

Unfortunately, for some years past, the Vaccination Act has been allowed to rest in abeyance, comparatively few children being vaccinated, and, practically speaking, no supply of lymph kept. One of the most pressing necessities attending the unexpected outbreak of small-pox at Launceston was to obtain a supply. The Health Departments of the other colonies were telegraphed to, and replied by sending all that could be spared, and the greater part of the limited supply at Hobart was also sent to Launceston, but it was not until the middle of August that the supply was anything like equal to the demand.

The following tables are recorded* independently of Mault's report by Dr. Pardey, who had charge of the patients:—

	Number.	Attacked.	Died
Never vaccinated	34	18	9
Deficient vaccination marks	22	10	1
Good, or fairly good	30	5	1†
Vaccinated and revaccinated	6	..	..
Had small-pox before	5	..	..
	97	33	11

* *Australian Medical Journal*, 15th May, 1888, p. 193.

† Complicated with Broncho-pneumonia.

The following table shows the form of small-pox in those attacked and the subsequent results; also the appearance of the vaccination marks in the different forms:—

—	Number.	Good Vaccination Marks	Deficient Vaccination.	Not Vaccinated.	Died.	Recovered.
Discrete	12	4	4	4	..	12
Semi-confluent	1	..	1	0	..	1
Confluent	11	..	5	6	3	8
Hæmorrhagic	9	1	..	8	8	1
	33	5	10	18	11	22

The cost of this epidemic is given in detail by Mault (*Annual Report, Central Board of Health, Tasmania, 1887*, p. 6), as follows:—

	£	s.	d.
Hospital buildings..	844 4 2
Furniture, bedding, &c.	733 19 10
Provisions and medicines	281 6 3
Salaries and allowances	1,734 15 3
Compensation for clothes, &c., and for time	2,285 12 6
Miscellaneous	1,785 19 6
Total	7,665 17 6

TABLE F.—PARTICULARS OF CASES WHICH OCCURRED DURING THE 1887 OUTBREAK.

Name.	Age.	Vaccination.	Remarks.
1. Ann Branchflower	26 years	Vaccinated at 10 years	Convalescent on admission to hospital
2. Wm. Branchflower	5 ..	Not vaccinated ..	Son of No. 1
3. M. White ..	37 ..	Vaccinated at 8 years	Nurse of No. 1
4. M. Bishop ..	49 ..	Vaccinated at 15 years	Mother of No. 1
5. D. Watson ..	36 ..	Doubtful, no marks ..	Next door to No. 1
6. H. Pearson ..	35 ..	Vaccinated infancy ..	Washed for No. 1
7. E. Spiers ..	8 ..	Not vaccinated ..	Daughter of No. 6
8. T. Hawkins ..	75 ..	Vaccinated, infancy ..	Father of No. 6
9. W. Bishop ..	46 ..	Vaccinated, infancy ..	Husband of No. 4
10. G. Branchflower	23 3/4 ..	Not vaccinated ..	Son of No. 1
11. H. Murray ..	31 ..	Vaccinated, infancy ..	Lodger at No. 4's
12. H. Watson ..	2 ..	Not vaccinated ..	Son of No. 5
13. S. Watson ..	3 months	Not vaccinated ..	Daughter of No. 5
14. G. Spiers ..	10 years	Vaccinated, infancy ..	Son of No. 6
15. A. Bennett ..	4 ..	Not vaccinated ..	At infant school near Nos. 6, 7, 8
16. J. Milligan ..	33 ..	Vaccinated, infancy ..	Frequented house of No. 4
17. C. Hind ..	34 ..	Not vaccinated ..	Nursed at No. 6
18. E. Hind ..	8 ..	Not vaccinated ..	Daughter of No. 17
19. W. Bishop ..	8 ..	Not vaccinated ..	Son of Nos. 4 and 9

TABLE F.—PARTICULARS OF CASES WHICH OCCURRED DURING THE 1887 OUTBREAK—*continued.*

Name.	Age.	Vaccination.	Remarks.
20. S. Rowe ..	3½ years	Not vaccinated ..	Parents related to Nos. 5, 12, 13; frequent intercourse
21. S. Watson ..	39 ..	Vaccinated, infancy ..	Sister-in-law to No. 5
22. B. Larter ..	38 ..	Not vaccinated ..	Frequent intercourse with No. 5
23. H. Chick ..	25 ..	Not vaccinated ..	Frequent intercourse with No. 5
24. L. Marshall ..	3 ..	Not vaccinated ..	Nephew of No. 29
25. C. Wilkinson ..	27 ..	Doubtful ..	Intercourse with No. 22
26. A. Mills ..	Adult	Not vaccinated ..	Intercourse with No. 4
27. D. Storrer ..	32 years	Vaccinated, infancy ..	Undertaker, buried Nos. 5 and 7
28. S. Houston ..	Adult	Vaccinated, infancy; revaccinated 30.9.87	Intercourse with No. 9
29. E. Hodges ..	43 years	Vaccinated, infancy ..	Intercourse with No. 27
30. K. Barkway ..	Adult	Not vaccinated ..	Father visited No. 5 during illness
31. E. Marshall ..	26 years	Vaccinated, infancy ..	Mother of No. 24
32. H. Ward ..	21 ..	Not vaccinated ..	Servant of No. 26
33. J. Wilkinson ..	36 ..	Doubtful ..	Husband of No. 25
34. William Smith ..	Not stated	Not stated ..	Don River case directly contracted in Launceston
35. Mary Lewis ..	Child ..	Unvaccinated ..	Evandale case, contact history not known

1888.

After an interval of ten months, during which no case was reported, two cases occurred in one family. The following extract from the official reports gives all the information now obtainable.

At the end of August (1888), the Local Board of Launceston notified the occurrence of a case of small-pox, the patient being Frederick Pearson, aged 9, living in a house in Elizabeth-street. Proper precautions were at once taken to isolate the case and those who had been in contact with it, and the necessary order to give effect thereto was made by the Governor in Council, under the provisions of the 14th section of the Act of 1887. Arrangements were also made with Dr. Elliott to isolate himself from his other patients and exclusively take charge of the case. In consequence of the interference of another medical practitioner, the family of the patient refused to be revaccinated or to remove into another house provided for them. Another of the family accordingly caught the disease, and the period of isolation of all had to be extended until the complete convalescence of the second case. Fortunately the cases were mild ones—the patients having been vaccinated when young—and no further cases followed. They were in all probability caused by infection resulting from the 1887 outbreak, as Pearson's family for a short time occupied a house that had been inhabited by persons who had suffered in that outbreak. Though the house had been cleansed and fumigated after the occupancy and death of one of these persons, it seems likely that some infected object had been overlooked and had come into the possession of young Pearson or one of the other children.—(*Central Board of Health Annual Report, 1888, p. 10*).

1903.

The second large outbreak of small-pox in Tasmania occurred in Launceston in the year 1903. There is no record of any case of this disease having occurred on land between the case in 1888 and the commencement of this

epidemie about to be described. The official report was compiled by Dr. Elkington, who was invited by the Tasmanian Government to take control of the epidemic when it was at its height, and who succeeded in extinguishing it. The history of the outbreak prior to Dr. Elkington's arrival was not very accurately kept, but the following facts are on record:—

Origin of Outbreak.—During the last few days of May and the first three weeks of June several persons, all in one locality, had been found to be suffering from an eruptive disease, accompanied by febrile symptoms. No suspicion of small-pox existed at the time, and no cases were known to be present in Australia. Chicken-pox, measles, and scarlet fever were somewhat prevalent and attended by the atypical forms which these exanthemata occasionally assume. Later on, about 20th June, cases of small-pox were reported from New Zealand and Victoria in connexion with the s.s. *Gracchus*, and some discussion appears to have arisen among the medical men attending as to the possibility of these Launceston cases being variolous in nature. None of these patients died, and the reports show that they were able in several cases to be up and about within a few days. On 3rd June, a man, F. D. (case number 3), was admitted to the general hospital with a history of obscure febrile illness for the previous few days. On the 5th, two days afterwards, he suddenly collapsed and died. It was recorded as a malignant form of scarlet fever, and was so described in the death certificate. A photograph was taken while the patient was in hospital, and, according to Dr. Elkington's report, this photograph showed points of difference from typical small-pox eruption. Inasmuch as this man definitely infected several other people, it must be accepted that the case was one of small-pox.

The first intimation received by the Local Board was a verbal report on 22nd June to the effect that there was a case of small-pox at the hospital. This was confirmed, and some six others were notified during the day.

It gradually became clear that prior to this notification there had been other cases of suspicious eruptive disease, and according to Dr. Elkington, while some of the cases were never definitely settled, the evidence goes to show that at least seven or eight cases existed outside the general hospital when the first report was made.

Dr. Elkington discusses the origin of the outbreak, and gives the following details:—

The first genuine case seems to have been that of a child named Mary Faults, of 210 Brisbane-street, who fell ill on or about 23rd May. On 9th May, she is stated to have attended the Empire Theatre. The type was mild, and the child was convalescent by 20th June. The second case in order of development was a boy named Vernon Cox, of 30 Margaret-street, who fell ill on 26th May. He also had attended the Empire Theatre twelve or fourteen days before. The third case was Francis Duggan, of North-street, who became ill about 29th May, and was admitted to the general hospital on 3rd June, with what proved to be hæmorrhagic small-pox. He is stated to have attended the Empire Theatre on 16th May. From these three cases the whole outbreak radiated, and they seem to bear a very definite relationship to the Empire Theatre. At this place of resort there was then playing a certain Mr. James Marion, a comedian who had arrived in Melbourne by the s.s. *Gracchus* on 2nd May.

The *Gracchus* was given pratique on arrival at Melbourne, but on 19th May the daily press announced two cases of small-pox as having occurred on board at Lyttleton, New Zealand, whither the vessel had gone in the interval. On 20th May, a case of small-pox was reported and quarantined in North Melbourne, the sufferer being a passenger from the *Gracchus*, who had been ill from 12th May. On the same day another case was reported from Ballarat, the wife of another *Gracchus* passenger, who upon examination

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This Map shows the distribution of cases during the epidemic of 1903. The numbers correspond to the numbers given in the text.

was himself also found to show the remains of a mild small-pox infection, from which he had suffered on board the steamer shortly after leaving Sourabaya, in Java, on 17th April.

On 23rd May, the man Marion was examined at Launceston by Dr. Holmes, who stated that he found no traces of small-pox, past or present, and that the man refused vaccination, but bore "good vaccination marks." Marion stayed at the Globe Hotel, and of course came into direct contact with many people, some of whom, more especially the fellow-members of his company, are said to have exchanged clothing with him for stage purposes. None of these people is known to have developed small-pox. Marion shortly afterwards left for New Zealand. After his arrival there he was quarantined for a time, suffering from traces of an eruption. Dr. Mason, Chief Health Officer stated that he had a macular rash when he was examined in New Zealand, closely resembling that of a previous case of small-pox dealt with in New Zealand. It is probable that this was the last remnant of a mild attack gone through before leaving Tasmania. Dr. Mason further states that the only vaccination cicatrices discernible were very faint, and dating back to infancy.

The actual origin of the outbreak has not been completely cleared up, despite close inquiry, but Dr. Elkington states that:—

"Sufficient evidence is available to place its connexion with the s.s. *Gracchus* almost beyond doubt."

It will be interesting to make a chronological table of the various events recorded, upon which the connexion of the *Gracchus* with the outbreak is based:—

Gracchus left Calcutta.

Gracchus left Sourabaya, 17th April, and passenger developed small-pox.

Patient discovered in Melbourne suffering from small-pox 20th May.

Arrived Melbourne, 2nd May.

Marion arrived Launceston, 4th May.

Gracchus passenger attacked, 12th May.

Mary Faulds attended theatre 9th May.

Two cases reported from Lyttleton 19th May.

Mary Faulds attacked, 23rd May.

Vernon Cox attended theatre, 12th to 14th May.

Vernon Cox attacked, 26th May.

Frances Duggan attended theatre, 16th May.

Frances Duggan attacked, 3rd June.

Table H. gives the essential details for the 66 cases that occurred. From this table it is clear that at least 44 of the cases obtained their infection as a result of direct personal contact, and it is equally clear that, with the single exception of the laundress at the hospital, who became infected by Duggan's clothing, there is not suggested in the table any other method of infection.

A map is included, showing the distribution of cases throughout Launceston and suburbs during this epidemic. The numbers shown on the map correspond with the numbers in Table H.*

It is quite clear that there were cases of small-pox, or at any rate some focus of infection, on board the *Gracchus*; and it is also clear that the three cases which are to be taken as the primary foci attended the Empire Theatre, at which Marion—a passenger by the *Gracchus*, who was discovered in New Zealand to be suffering from an eruption diagnosed as small-pox—was performing.

It is a little difficult to understand why these three members of the audience should have contracted the infection at so great a distance as they would be from the stage, while the other members of the theatrical company and the visitors at the hotel, who were in much closer contact, should have escaped; but as no other explanation of the origin of the outbreak is forthcoming,

* For this map I am indebted to the courtesy of Mr. Murnane, the Health Inspector of the Launceston City Council.

and as Dr. Elkington, who investigated the matter at the time, states that the connexion of the outbreak with the *Gracchus* is almost beyond doubt, this must be accepted.

Subsequent Course of the Outbreak.—During the outbreak, a total of 66 cases were confirmed by reports from the medical men themselves, and of these nineteen, or 28.8 per cent. died. Ten additional cases were closely investigated, and of the latter six were included in the report for various reasons "as suspected" cases, not being thoroughly confirmed. The remaining four were definitely negatived.

The type of the disease was on the whole somewhat severe—62 per cent. being classed as "severe," "hæmorrhagic," "confluent," and "coherent."

By infection from the case Duggan other cases arose, all in the hospital; one patient in the same ward subsequently after discharge developed small-pox, and in turn infected some eight people. The nurse who had been attending Duggan became ill on 16th June, and died in three days. The porter who had taken Duggan's body to the mortuary became ill on the 18th; the junior medical officer developed a mild eruption on the 22nd, and on the same day the laundress at the hospital who had washed Duggan's linen also showed a varioloid eruption—that is to say, this one patient infected five of the hospital staff.

From Vernon Cox, according to the report, the greater number of the subsequent cases arose directly or indirectly. The brother and brother-in-law, who lived in the same house both developed the disease; the wife of the latter and another brother, who lived a few doors off, passed through very suspicious illnesses; the wife of the latter brother died under circumstances which, from the history, are emphatically suggestive of hæmorrhagic small-pox. Nine other persons who visited the house during his illness also developed variola.

As Dr. Elkington with much force remarks—"It is somewhat surprising that the infection did not spread much further than it did before effective measures were taken against it."

The outbreak terminated with the admission to the hospital of the 66th case, on 3rd September.

One important source of infection deserves mention: In the earlier stages of the epidemic, and before Dr. Elkington assumed control, it was found necessary to erect hospital accommodation for the patients, and this work had to be continued after the admission to the hospital of the first batch of patients; the grave mistake was made of omitting to vaccinate these workmen before allowing them to commence this work, and, as a consequence, five cases eventuated directly and indirectly from this very serious omission.

Vaccination.—The lesson afforded to the people of Launceston by the outbreak 15 years before, had failed to impress upon them the necessity of maintaining a supply of vaccine lymph. To quote from the report:—

At the commencement of the outbreak the supply of lymph was quite inadequate to meet the number of applicants, and in some cases sufficient could not be obtained to protect active contacts. Arrangements were made for the supply from Victoria and New Zealand, but, as is usual in such emergencies, the greater part of the lymph arrived after the most pressing need for it was over.

The tables which are taken from Dr. Elkington's report are very interesting, as showing that "even a single vaccination seems to be able to avert

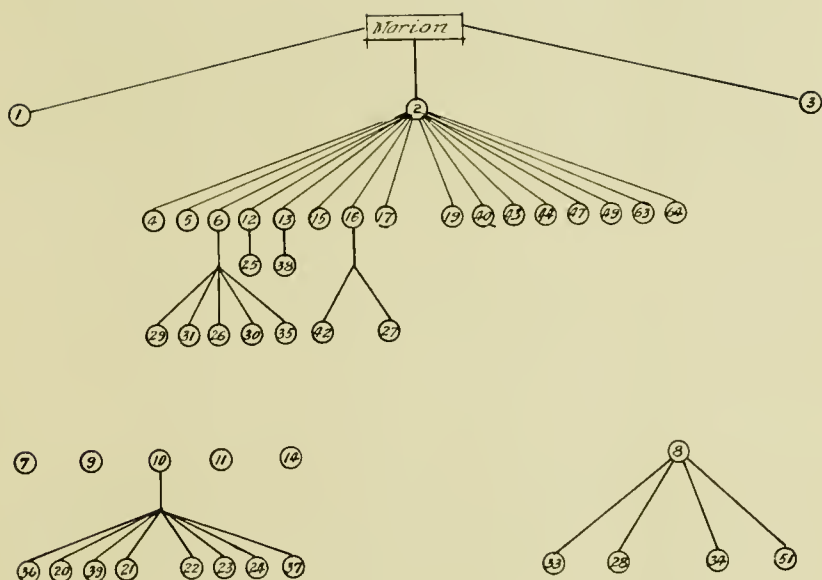


Figure 2.—Sequence of Cases in Launceston Epidemic of 1903.

the disease for many years, and it is a significant fact that, while no case of small-pox occurred in a vaccinated person under 20 years of age, twenty-eight cases, with five deaths, were met with amongst the unvaccinated."

That, in addition to the mere fact that vaccination has been performed, much of the success of the operation depends upon the thoroughness with which it is done is shown in the second of the two tables. This table shows conclusively, not only the protection afforded against the disease, but also that in those cases where the operation was not properly performed, and therefore complete immunity not obtained, the severity of the attack was proportionate to the thoroughness of the operation and possibly also to the potency of the lymph used. The fact that certain "vaccinated" persons did actually contract the disease is thus shown to be no valid argument against the protective power of properly performed vaccination.

The fact that calf lymph was universally used on this occasion shows that the "ignorant preference given to calf lymph," referred to by Mault in his account of the previous epidemic, had been converted during the 15 years' interval into a well-founded conviction of the reliability of lymph derived from the calf.

The particulars relating to vaccination are tabulated hereunder, and from these tables it is seen—

- (1) That no vaccinated person under 20 contracted the disease, while 28 unvaccinated persons did contract the disease, and five of them died.
- (2) That amongst the vaccinated patients of all ages 16.6 per cent. died, while amongst the unvaccinated patients of all ages 31.6 per cent. died.

The obvious deduction is that under the conditions of this epidemic the protection of vaccination up till the twentieth year of age was absolute, while the protection still remaining after that age was pronounced—the probability of a fatal result occurring being distinctly greater in the vaccinated patient than in the unvaccinated.

While this protection afforded by vaccination is noticeable when judged by the severe test of mortality, it is still more pronounced when considered by the test of its action in modifying the severity of the attack as seen in Table G.

Of the "severe" cases, 76.5 per cent. were unvaccinated; while only 11.8 per cent. had been vaccinated, and in all of these the vaccination marks were "poor."

Of the "mild" cases, 75 per cent. had been vaccinated; while 25 per cent. were unvaccinated.

So that the same comment can be made in this instance that was made in connexion with the epidemic in Sydney in 1881-2, namely, that while, after the first few years, vaccination does not absolutely prevent the development of small-pox, yet the unvaccinated man had a 75 per cent. chance of having a *severe* attack, while the vaccinated man had a 75 per cent. chance of having a *mild* attack. The chances are therefore reversed by vaccination in favour of the patient.

No information is available as to the incidence of small-pox amongst the vaccinated and unvaccinated persons exposed to infection.

The total cost of suppressing this epidemic was a little less than £20,000.

TABLE F.

TOTAL CONFIRMED CASES.

Age Incidence (all Classes).

		Vaccinated.				Total for Vaccinated.		Stated Vaccinated, but without Cicatrices.		Unvaccinated.	
		Once.		Twice.							
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
0-5..	..	..	..	..	..	..	..	..	2	1
5-10	..	..	..	..	..	..	..	..	6	2
10-15	..	..	..	..	..	..	..	..	11	1
15-20	..	..	..	..	..	..	1	1	9	1
20-30	..	5	2	1	..	6	2	..	5	3	
30-40	..	5	..	2	..	7	..	3	2	..	
40-50	..	9	2	..	..	9	2	..	2	1
50 and over	..	2	..	..	..	2	..	..	3	3
		21	4	3	..	24	4	4	3	38	12

TABLE G.

ISOLATION HOSPITAL ADMISSIONS.

Fifty Cases Considered.

				Severe, i.e., Confluent, Hemorrhagic and Coherent.	Mild, i.e., Discrete and Varioloid.	Case Mortality per Centum.
One cicatrix	..	Good	..	..	1	}
	..	Poor	..	2	..	
Two cicatrices	..	Good	..	Nil	2	}
	..	Poor	..	Nil	Nil	
Three cicatrices	..	Good	..	Nil	4	}
	..	Poor	..	2	Nil	
Four or more cicatrices	..	Good	..	Nil	5	}
	..	Poor	..	Nil	Nil	
Stated vaccinated, but no traces discernible	..	..	..	4	Nil	75
Unvaccinated	..	..	..	26	4	30
Totals, all Classes, Hospital admissions considered	..	..	..	34	16	28

TABLE H.—SMALL-POX OUTBREAK AT LAUNCESTON, 1903.—CONFIRMED CASES.

No.	Name.	Address.	Age.	Date of Onset of Symptoms.	Vaccination Particulars.	Remarks re Possible Source of Infection.	Type of Disease.	Termination
1	Mary Faulds	210 Brisbane-street	11	23rd May	Not vaccinated	(?) Empire Theatre	Discrete	Convalescent, 29th June
2	Vernon Cox	30 Margaret-street	16	26th May	Not vaccinated	(?) Empire Theatre	Severe	Discharged, 3rd August
3	Francis Duggan	14 North-street	45	28th May	Three faint infantile marks	(?) Empire Theatre	Hæmorrhagic	Died, 5th June
4	Herbert Cox	80 Margaret-street	19	14th June	Not vaccinated	Contact, V. Cox	Severe	Discharged, 3rd August
5	Norman Reddy	80 Margaret-street	26	14th June	Infancy, 1 good mark	Contact, V. Cox	Mild	Discharged, 1st August
6	Sislie Harber (Mrs.)	4 Frederick-street	39	15th June	Three good infantile marks	Contact, 30 Margaret-street	Mild	Discharged, 7th August
7	Nurse Cash	General Hospital	27	16th June	Three infantile marks	Contact, Francis Duggan	Hæmorrhagic	Died, 19th June
8	Elvie Musgrave	121 Elizabeth-street	9	17th June	Not vaccinated	Contact, history not definite	Severe	Discharged, 4th August
9	Thomas Johnstone	General Hospital (Wardman)	24	17th June	One infantile mark	Contact, Francis Duggan	Severe	Convalescent, 1st August
10	Benjamin Adams	Patient, General Hospital	16	17th June	Not vaccinated	Contact, Francis Duggan	Mild	Discharged, 19th August
11	Sophia White (Mrs.)	General Hospital (Laundress)	40	17th June	Three good infantile marks	Washed Duggan's linen	Mild	Discharged, 20th August
12	Rose Tilley (Mrs.)	Margaret-street	29	18th June	Not vaccinated	Contact, 30 Margaret-street	Severe	Discharged
13	Albert Thompson	256 Brisbane-street	5	18th June	Not vaccinated	Contact, No. 1 or 2, or both	Severe	Recovered, 27th July
14	Dr. James Barnard	General Hospital (House Surgeon)	27	19th June	Twice vaccinated; infancy, and again when 8 years of age	Contact, Francis Duggan	Very mild	
15	Wm. J. Wilson	Middle-st., off Margaret-st.	49	20th June	Three poor infantile marks	Contact, 30 Margaret-street	Severe	Discharged, 20th August
16	Josephine Davis	187 York-street	9	20th June	Not vaccinated	Probably contact of Margaret-street	Severe	Discharged, 28th August
17	Leah Jolly	Stone-street	15	20th June	Not vaccinated	Contact, 30 Margaret-street	Severe	Discharged, 20th August
18	Hephtha Savage	Well-street, Beaconsfield	37	21st June	At 7 years of age	Contact not traceable	Mild	Released, 10th August
19	Annie Patman	8 Bedford-street, Inveresk	17	22nd June	Not vaccinated	Contact, 30 Margaret-street	Severe	Discharged, 8th Sept.
20	Mrs. Bartlett	Black Creek, Letroy	73	About 30th June	At 40 years of age	Contact of Benjamin Adams	Mild	Released, 8th September
21	Mrs. Adams	Black Creek, Letroy	40	About 30th June	At 13 years of age	Contact of Benjamin Adams	Severe	Released, 8th September
22	Thomas Adams	Black Creek, Letroy	11	About 30th June	Not vaccinated	Contact of Benjamin Adams	Mild	Released, 8th September
23	Rebecca Adams	Black Creek, Letroy	4	About 30th June	Not vaccinated	Contact of Benjamin Adams	Mild	Released, 8th September
24	Victor Adams	Black Creek, Letroy	42	About 30th June	Not vaccinated	Contact of wife (Case No. 12)	Mild	Released, 8th September
25	Donald Tilley	Margaret-street	7	3rd July	Not vaccinated	Contact, Mrs. Harber	Severe	Discharged
26	Louell Harber	4 Frederick-street	35	3rd July	Stated vaccinated; fancy; no marks	Contact of daughter (Case No. 16)	Severe	Died, 18th July
27	Mary Davis (Mrs.)	187 York-street	13	3rd July	Not vaccinated	Contact of sister Elvie (Case No. 8)	Severe	Discharged
28	Ella Musgrave	121 Elizabeth-street	13	3rd July	Not vaccinated	Contact of Mrs. Harber	Severe	Discharged
29	Harold Harber	4 Frederick-street	11	3rd July	Not vaccinated	Contact of Mrs. Harber	Severe	Discharged
30	John Harber	4 Frederick-street	9	3rd July	Not vaccinated	Contact of Mrs. Harber	Severe	Died, 18th July
31	Roy Prosser	121 Elizabeth-street	45	4th July	Three fair infantile marks	Contact of daughter (Case No. 8)	Mild	Discharged, 4th August
32	Alex. Musgrave	121 Elizabeth-street	10	4th July	Not vaccinated	Contact of sister Elvie (Case No. 8)	Severe	Discharged
33	Alice Musgrave	121 Elizabeth-street	12	4th July	Not vaccinated	Contact of sister Elvie (Case No. 8)	Severe	Discharged
34	John Musgrave	121 Elizabeth-street	16	4th July	Not vaccinated	Contact, 4 Frederick-street	Severe	Discharged
35	May Nelson	148 Brisbane-street (residing at Newstead)	21	6th July	Not vaccinated	Contact, Benjamin Adams	Severe	Died, 13th July
36	Thomas Westbrook	Mowbray	..	..	..	..	..	..

TABLE H.—SMALL-POX OUTBREAK AT LAUNCESTON, 1903.—CONFIRMED CASES—continued.

No.	Name.	Address.	Age.	Date of Onset of Symptoms.	Vaccination Particulars.	Remarks re Possible Source of Infection.	Type of Disease.	Termination.
37	Charles Tattersall	Ravenswood, Mowbray	43	6th July	Vaccinated in infancy	Contact, Benjamin Adams	Very mild	Recovered rapidly
38	Eliza Thompson (Mrs.)	256 Brisbane-street	34	6th July	One infantile mark	Contact of son (Case No. 13)	Mild	Released, 27th July
39	Emily Tattersall	Ravenswood, Mowbray	38	7th July	Two good infantile marks (infancy, and at 8 years)	Contact, Benjamin Adams	Very mild	Discharged, 19th August
40	William Bracken	167 Margaret-street	49	9th July	Three poor infantile marks	Contact, 30 Margaret-street	Severe	Died, 15th July
41	Nurse Massey	Isolation Hospital	32	14th July	Three infantile and five recent marks	At Isolation Hospital	Very mild	Recovered in a few days
42	John Stanwix	York-street	11	16th July	Not vaccinated	Contact of Davies, 187 York-street	Mild	Discharged
43	Ray Thompson	Elphin-road	6½	22nd July	Not vaccinated	Contact, 30 Margaret-street	Severe	Discharged
44	Esther Jones (Mrs.)	Ward's quarters, R.M. goal	46	23rd July	Not vaccinated	Probably indirectly from 30 Margaret-street	Severe	Died, 28th July
45	Andrew Brown	8 Albert-street	34	24th July	Four good infantile marks	Workman at Isolation Hospital	Mild	Discharged, 27th August
46	Arthur Gladshy	6 St. George's-square	27	25th July	Not vaccinated	Isolation Hospital workman	Severe	Discharged
47	Fredk. W. Barston	49 Frederik-street	13	25th July	Not vaccinated	Contact, 30 Margaret-street	Mild	Discharged
48	Francis Lardo	47 Galvin-street	49	25th July	Three good marks, boyhood	Workman at Isolation Hospital	Mild	Discharged
49	Florence Jackson	Newstead	21	25th July	Not vaccinated	Contact of 30 Margaret-street	Severe	Died, 15th August
50	Doris Dinsey	Vincent-street	1½	25th July	Not vaccinated	Father employed as guard on infected houses	Severe	Died, 8th August
51	Dora Matthews	Margaret-street	11	27th July	Not vaccinated	Contact of 121 Elizabeth-st.	Severe	Discharged
52	James Cox	er. Vincent and St. John streets	55	27th July	Stated vaccinated; no evidence	Contact, probably indirect from a guard	Severe	Died, 10th August
53	Minnie Cox	63 Margaret-street	32	27th July	Not vaccinated	Probably indirect	Severe	Died, 8th August
54	Wm. Henry Cox	63 Margaret-street	23	27th July	One faint infantile mark	Probably indirect from a guard	Severe	Died, 14th August
55	Ella Norine Young	14 Cleveland-street	9	27th July	Not vaccinated	Father a guard; probably indirect	Severe	Died, 10th August
56	Arthur Chance	56 Tamar-street	16	28th July	Not vaccinated	See Note to Table of suspected cases	Hæmorrhagic	Died, 10th August
57	Josephine Chance	56 Tamar-street	22	28th July	Not vaccinated	"Employed during erection of Isolation Hospital buildings	Hæmorrhagic Mild	Died, 8th August
58	Henry Wilson	Green-street, Invermay	27	28th July	Four good infantile marks	Probably indirect	Mild	Discharged, 27th August
59	Mary Ann Cox (Mrs.)	63 Margaret-street	57	1st August	One good infantile mark	No definite history	Mild	Discharged
60	Henry Mullens	Benevolent Asylum	50	1st August	Two good old scars	Employed during erection of Isolation Hospital buildings	Severe	Discharged
61	Ernest E. Bird	72 Arthur-street	19	Stated 25th July	Stated no evidence	History doubtful, see note	Severe	Died, 18th August
62	Florence Myrtle Brooks	53 Margaret-street	16	17th August	Not vaccinated	Contact of family	Hæmorrhagic	Discharged
63	Joseph Chance	" Glen Din " (residence, 56 Tamar-street)	61	18th August	Not vaccinated	"	Hæmorrhagic	Died, 25th August
64	Thomas Humphrey	" Glen Din " (residence, 63 Margaret-street)	59	18th August	Not vaccinated	Contact of family	Severe	Died, 30th August
65	Michael Forbes	51 Margaret-street	33	24th August	Four good marks at 13 years of age	History doubtful, see Note	Mild	Discharged
66	John Hubert Clarke	Wellington-road, Sand Hill	19	1st September	Stated, no evidence	History doubtful	Severe	Died, 12th September

CHAPTER VI.

SMALL-POX IN WESTERN AUSTRALIA.

The absence of small-pox from Western Australia up till 1843 is indicated in the Second Annual Report of the Registrar-General, dated 13th October, 1843, in which the following occurs:—"Measles, small-pox, typhus, or puerperal fevers, or any of these dire diseases to which the Mother country is subjected are here unknown."

1869.

In 1869, an outbreak of small-pox occurred amongst the aborigines in the north-western portion of Western Australia. The references to this are very meagre.

Police Constable Watson wrote on the 10th of March, as follows:—

Will you be good enough to inform the Resident Magistrate that the natives are getting better. There are not so many sick at present, but a good many of them are in a very low state. There are no white people sick with it up here, nor any natives on this side of the Darling Range.

At a later date the same constable writes "some that have got better have been left much marked." On 18th April, 1869, the Resident Magistrate (Mr. Maitland Brown) reported to the Colonial Secretary:—

In compliance with the instructions contained in your letter directing me to furnish you before the departure from Perth of the Medical Officer for Victoria,* with report of the disease resembling small-pox which has recently made its appearance upon the Irwin, I have the honour to state that Police Constable Watson informed me on the 5th inst. that in his opinion the disease is abating from amongst the natives. He, however, states that large numbers of natives have died, and mentions one instance in which the whole camp of seventeen in number died before assistance could reach them. I regret to state that the disease is undoubtedly spreading amongst the white population. In my former letter I mentioned, upon the testimony of Dr. Bompas, that Mr. Pascoe's family had been attacked by it, and on the evening of the 5th I was myself called to see a man named Maughan, at Dongarra, who was prostrated by disease and in a very precarious condition. He is a mass of ulcers from head to foot, save his face, which is merely discoloured.

In the *Enquirer and Commercial News*, of 26th May, 1869, the "Champion Bay" correspondent writes:—

The small-pox has, I believe, not spread any further, and the prompt measures taken by the Resident Magistrate have done much towards stopping the contagion.

The correspondence quoted above is taken from the official records in the Colonial Secretary's Office in Perth. These extracts are the only reference that could be found to this outbreak. From these it appears that a considerable number of natives were attacked. As to the incidence of the disease upon Europeans, it would appear that the diagnosis of small-pox was made by a medical man in one family and that one other white man probably had the disease.

The evidence of older residents and officials supports this account of a widespread epidemic amongst the natives. The present Protector of Aborigines in Western Australia (Mr. C. Gale) stated verbally to the writer that when he was in the Carnarvon District, in 1885, there was a clear history of small-pox amongst the natives, and that many of the older men showed

* That is, Victoria Plains, now Geraldton District.—J.H.L.C.

definite pock marks. Mr. Gale recollects that upon questioning the aborigines as to the length of time since the outbreak, he was shown a lad, about 16 years old, and was told that the epidemic occurred when that boy was a baby, which is consistent with the known date of the epidemic. The present magistrate at Perth, Mr. A. S. Roe, informed the writer that he could distinctly remember seeing pock-marked natives in the Roebourne District in 1872, but was not prepared to commit himself to any further details.

It is clear, therefore, that there was an epidemic affecting principally the aborigines, and extending at least from Dongarra (which is 40 miles south of Geraldton) to Carnarvon, a distance in all of about 200 miles. There is no evidence pointing to the source of the disease, and all that can be said in this connexion is that there was an epidemic of small-pox at the same time in Melbourne, and that communication between Singapore and the Dutch East Indies and this part of Australia was at that time comparatively frequent.

1893.

The second epidemic of small-pox in Western Australia occurred in 1893. The account of this epidemic is taken from the official records in the Colonial Secretary's Department, a report by the Medical Officer of Health to the city of Perth, and contemporary newspapers.

On 19th March, 1893, a Cingalese, named Bryan, was admitted to the Perth Hospital. At the time he was taken ill he was a servant to a lady in Perth, and when admitted to the hospital, he was diagnosed as suffering from small-pox. The patient had arrived at Fremantle from Singapore by the s.s. *Saladin* on or about the 26th February. On the voyage, a man had jumped overboard in the Straits of Sunda, and it was believed that this man was suffering from small-pox. This supposition is supported by the fact that several of the officers of the vessel on arrival at the next port expressed great reluctance to proceed further with the vessel because of their belief that the case had been one of small-pox.

Although the vessel arrived at Fremantle on 26th February, Bryan, who was a fireman on board, did not leave her until 7th March, the day before she left on her return voyage to Singapore. As he sickened on 19th March, it is obvious that the infection is directly referable to the *Saladin*. It is important to note that it is reported that a man was ill on board during the stay of the vessel at Fremantle, was "covered with spots," and that it was generally supposed that he had small-pox, although the doctor attending him diagnosed the disease as syphilis.

On the 25th April the *Saladin* again arrived in Fremantle, having made a journey to Singapore in the meantime. The Captain reported that on the way from Fremantle to Singapore, a Chinese passenger developed small-pox three days after leaving Broome. This Chinaman had resided in Perth for the preceding six months and was apparently quite well when he left Perth. "Three days after leaving Broome" would be the tenth or eleventh day after leaving Fremantle, in these times, and it is only necessary to assume a slightly slower rate of steaming in those days, or that the Chinaman went on board the day before the boat left Fremantle, to make the necessary twelve days of incubation date from the time of this Chinaman's arrival on board the *Saladin*.

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This Map shows the distribution of cases during the epidemic of 1893. The numbers correspond to the numbers given in the text.

It seems clear therefore that the *Saladin* was responsible for the outbreak and that there were probably four cases of small-pox on the ship itself.

It is recorded that the patient was isolated upon his arrival at the hospital and that vaccination was carried out, but there are no details as to the extent of the vaccination. Presumably either the isolation or the vaccination was faulty, as the next case was one of the nurses in the hospital, who developed the disease on 3rd April. It should be mentioned here that the whereabouts of all the passengers of the *Saladin* was ascertained as accurately as possible, but, so far as records show, no further cases were reported amongst these passengers. The third case was reported on 6th April, and this person is stated to have visited a relative at the hospital about a fortnight prior to her attack, and it is also stated that she had washed some infected clothing, but the "Health Committee, which has investigated both these reports, has not yet arrived at anything like a verification of these statements." (*West Australian*, 8th April). On 12th April, a case was reported from Fremantle in the person of a young woman who had been discharged from hospital on 1st April. Although it is recorded, as stated above, that the patient was isolated at the hospital on the same day as the disease was detected and that vaccination was carried out, yet in some way the infection became widespread, for subsequently 51 persons were attacked, and of these nine died.

It is noteworthy that until 16th May, the majority of cases occurred in the immediate vicinity of the hospital; but the records kept at the time are not sufficiently complete to enable the exact course of the infection to be traced. Certainly direct infection from person to person can be traced in some of the cases: for example, case number 43 had been nursing case number 4, and before her removal to hospital case number 39 lived next door to number 4 and also worked at the same establishment as case number 40. Case number 47 was a brother of case number 45, and case number 46 was an assistant of the undertaker who buried those who died from the disease. Cases 49 and 50 were respectively the orderly and cook at the isolation camp, which was established in the bush, about 3 miles west of Perth, on 14th April. Cases 35 and 48 are worthy of notice inasmuch as the first of these travelled from Perth to Albany, where the disease was discovered on 20th April. This patient was isolated at the Albany Hospital for a short period, before being removed to the Quarantine Station at that place, and case 48 was the wife of the caretaker at the hospital.* The last case was reported on 21st May and the total number of cases throughout the epidemic was 52—47 in Perth, three in Fremantle, all of whom had been infected in Perth, so far as can be ascertained, and two in Albany, already discussed. The cost of the outbreak to the State was over £20,000.

As is the unfortunately too common experience, the administration at the commencement of the epidemic was unsatisfactory, as is indicated by the occurrence of three cases amongst the hospital staff, but it is undoubted that the epidemic was finally stopped by the measures invariably recognised to be the most valuable on such occasions. To quote from the report of Dr. O'Connor, the Health Officer—"There can be no doubt whatever that the epidemic of 1893 was stamped out by vaccination, assisted by isolation and quarantine."

* Case 35 is the person referred to by Dr. Gresswell at the Inter-State Conference on Quarantine held in Melbourne in 1896. See Transactions, page 14.

Vaccination.—The position of prime importance assigned to vaccination by Dr. O'Connor is seen by the figures he gives of the 50 cases (that is excluding the Albany cases), thirteen were unvaccinated, and of these thirteen nine died and four lived.

The four lived, after a most serious illness, lasting for days and they now carry the scars of small-pox to their graves. The remaining 37 lived, and have not only lived, but never for an instant after the first couple of days gave a moment's anxiety, and with hardly a mark on their faces.

Another phase of this vaccination question was an experience which is also unfortunately common, that is, that the supply of vaccine lymph in Perth at the commencement of the epidemic was quickly exhausted and considerable delay occurred before further supplies could be obtained. It is not improbable that this state of unpreparedness was responsible to a certain extent for the spread of the epidemic in the early stages.

Certain incidents in connexion with this epidemic are worth recording as showing an excess of zeal in certain unimportant directions which was in rather marked contrast to the evidences of lack of organization in essential matters. "On 4th April, a dog came into the police court which was recognised as belonging to one of the infected houses. Considerable alarm was created, every one keeping clear of the dog, which manifested a troublesome desire to caress every one. Finally, a brave constable removed the dog, and order was restored."—(*West Australian*, 5th April.)

The following notice was inserted in the daily newspapers by the Fremantle Local Board of Health:—

Small-pox Public Notice.—Mr. Carroll, in charge of the quarantine station at Woodman's Point, has been authorized to convey all persons infected with small-pox or other contagious disease to the Quarantine Station. He will carry a yellow flag on a pole and will not be permitted to enter any dwelling except for the purpose of removing a patient. The public are asked in all cases to keep on the *weather side* when they are passing the conveyance.

The Bunbury Local Board of Health imposed the following restrictions on the steamship *Nemesis*, which arrived at that port from the Eastern Colonies on 24th April. No persons from the town were permitted to go near the ship. The sailors had to work the cargo themselves, taking it to the middle of the jetty, where it was allowed to remain until after the departure of the vessel, when it was then taken charge of by the inhabitants. There had not at this time been any small-pox in the Eastern Colonies for several years. There had never been a case in Bunbury, which is more than 100 miles from Perth.

Table I gives such details as are available relative to the cases in this epidemic. They were very imperfectly noted and recorded.

The numbers in this table correspond with those on the map re-produced.

1. Cingalese from <i>Saladin</i> ..	..	21st March	..	care of Miss Keogh
2. Nurse at hospital ..	..	3rd April	..	Perth Hospital
3. Amelia Bogue ..	..	6th ..	..	corner Pier and Wellington streets
4. Mrs. Montague, died 18th April ..	..	9th ..	..	Bullen's yard, off Goderich-street
5. Targess ..	..	11th ..	..	Moore-street
6. Stacey, died 24th April ..	..	11th ..	..	Wellington-street
7. Chas. Bresenden ..	..	12th ..	..	? address
8. Miss Howard, Fremantle ..	..	12th ..	..	Discharged from hospital, 1st April

Table I—*continued.*

9. John McAllen	13th April	.. ? address
10. Samuel Proctor	13th ..	.. Murray-street
11. William Sullivan, <i>aet.</i> 3	13th ..	.. Female Home, Goderich-street
12. John Morris	14th ..	.. Australian Hotel
13. Miss Dore	14th ..	.. Howick-street, second house on right past Irwin-street, going east
14. Reuben Adams, <i>aet.</i> 30, died 26th April	16th ..	.. Goderich-street, in boarding house nearly opposite hospital. Foreman at Gill & Coy.'s timber yard
15. John Parsons, <i>aet.</i> 18	16th ..	.. Brown-street, off Lord-street
16. Robert Healey .. ..	.. ..	.. Lane off Wellington-street, within 50 yards of Mrs. Bogue's residence and opposite Staacey's
17. Mrs. Neeson	16th April	.. Mt. Bay-road
18. Miller, Fremantle ease .. ..	.. ..	.. Treated at Woodman's Point Quarantine Station
19. Captain Crook, died 29th April, 17th April	17th April	.. Goderich-street
20. J. Reneas	17th ..	.. Murray-street
21. Sullivan	17th ..	.. Murray-street
22. Mrs. Mitchell	17th ..	.. William-street
23. Mrs. McPherson, died 24th April..	17th ..	.. Roe-street
24. — Hardinge	17th ..	.. Murray-street
25. Miss Sallinger	18th ..	.. Howick-street
26. Hood	18th ..	.. Wellington-street
27. Searey	18th ..	.. ? address
28. Bradport	19th ..	.. Lodgings in George-street
29. Miss Sutledge	19th ..	.. Cemetery-road
30. Miss Sherlock	19th ..	.. Mackay-street
31. Ptolemy	20th ..	.. Guildford-road
32. Miss Stamp	20th ..	.. Hay-street
33. Mrs. Newman	20th ..	.. Hay-street
34. Turner, at Fremantle	20th ..	.. Been performing as aerobat in Aekerman Bros.' circus, Perth
35. Isaac Allen, Albany ease	20th ..	.. Came from Perth
36. Elphick	21st ..	.. Brick yards
37. Skinner, ? ease	23rd ..	.. Corner Murray and King streets
38. William Jones	30th ..	.. Lord-street
39. Kirby	1st May	.. Lived next to Mrs. Montague, Bullen's yard
40. Head .. ..	.. ..	.. Bullen's yard
41. Moore	1st May	.. Round the corner in Wellington-street
42. Hogan	1st ..	.. Hill-street
43. Miss Swallow	1st ..	.. Nursing Mrs. Montague; said to be inoculated through a wound in one of her fingers
44. Smith	2nd ..	.. Howick-street
45. James Connacher	2nd ..	.. Living near the Tunnel; doubtful ease from the Canning timber mills
46. Golding	2nd ..	.. Assistant of undertaker who buried the cases who sue-embed
47. Connacher	3rd ..	.. Brother of James Connacher
48. Mrs. Andrews, Albany	9th ..	.. Wife of caretaker at hospital where Allen (35) was placed before removal to Quarantine Station
49. William Warren	9th ..	.. Orderly at Subiaco Camp
50. William Whitmore	9th ..	.. Cook at Subiaco Camp
51. Halliburton	11th ..	.. Living in a tent about $\frac{1}{2}$ mile from Highgate Hill church
52. Owen	21st ..	.. Lamb-street; been ill for 9 days

1901.

In 1901, the *Ormuz* passed through Fremantle without medical inspection, and it was discovered, on the vessel's arrival at Adelaide, that there was a case of small-pox on board. During the vessel's stay in Fremantle, a water-policeman had been stationed on board the vessel, and he developed small-pox on the twelfth day after the vessel's departure.

There are no records to show whether he had any communication with any sources of infection, but it is certain that no other case occurred in Western Australia as a result. As, however, he was engaged in detective duties on the boat, it is quite possible that he found it necessary to come into more or less close contact with the patient, more especially as the patient—a seaman—who had first fallen ill on 6th May, was up and at his work again by the time the vessel had reached Fremantle.—(*West Australian*, 19th June, 1901.)

The vessel arrived at Fremantle on 15th May and stayed there one day only. The policeman first became sick on 27th May, exactly twelve days afterwards. This case is highly interesting as the incubation period is determinable with nice exactitude.

EPIDEMIC AMONGST THE PEARLING FLEET AT BROOME, 1904.

In 1904, an outbreak of small-pox occurred amongst the Asiatics on board of the pearling fleet which had its head-quarters at Broome, but which was at the time of the occurrence of the first cases some 100 miles or more out at sea.

The first case was discovered on the lugger *Dora* when she arrived at Broome on 2nd July, 1904. This man was one of the crew, and at the time of his arrival at Broome, had the remains of a well-marked eruption. It is stated in the records that he was quite well and had never felt ill, and also that he had been at some time previously well vaccinated.

This man had been transferred after the commencement of his attack from the schooner *Kalander Bux* to the *Dora*, but there is no evidence to show how long he had been on the *Kalander Bux* before the onset of his attack.

Upon the arrival of the *Dora*, the vessel and all her crew were isolated and quarantined on the vessel. Subsequently other cases arose on the lugger, and by the 15th of July, three other cases had developed, making a total of four on the lugger at Broome. On that day a fifth case was reported among the quarantined crew.

On the 1st of August still another case developed, making a total of six on this vessel, and on the same day the schooner *Kalander Bux* arrived at Broome with two other cases on board. The sequence of the dates makes it probable that these two last cases were infected from the original case, rather than that they contracted the disease from the same source as the original case.

Although all the cases affected on the 15th July were on that date removed to an isolation camp on shore, and although all cases subsequently arising were removed at once to the same camp, only one case developed amongst the inhabitants of Broome, and that case was an aboriginal police boy who showed the first symptoms on 19th July—so that he could not have been infected after the patients were removed on shore.

The source of the infection in this last-mentioned case is obscure, as also is the source of the infection amongst the vessels of the pearling fleet. Having in view the occurrence of the disease on the *Sultan* and the quarantine of cases of small-pox at Broome from the 4th of May until the 16th of June, it was claimed that the source of the disease in both instances was infection from the *Sultan* cases. It is certain that the police boy was camped quite close to the camp where the *Sultan* cases had been isolated when his attack commenced; but there is no evidence to show whether the infecting case in the other group had had any connexion with the *Sultan* case or not.

Dr. Lovegrove, the Principal Medical Officer who investigated the outbreak on the spot, expressed his conviction that the outbreak was due to the case which occurred on the s.s. *Sultan* (see p. 86), but gives no evidence in support of that conviction.

The outbreak was stopped by the energetic measures adopted by Dr. Lovegrove. All the necessary equipment was taken from Perth in a Government steamer, and Dr. Lovegrove and his assistants cruised about visiting each of the pearling fleets in turn and vaccinated everybody, disinfected all clothing, bedding, &c., fumigated the ships, and examined all members of the crews. Other than those above detailed, no further cases arose, and this cessation of the epidemic is undoubtedly to be attributed to the complete vaccination performed.

In considering the fact that no cases arose among the white population on shore, it must be borne in mind that the isolation hospital was only 15 chains from the town and 12 chains from the nearest house.

CHAPTER VII.

SMALL-POX IN SOUTH AUSTRALIA.

SMALL-POX IN SOUTH AUSTRALIA AFTER 1857.

The occurrence in Adelaide, in 1882, of illness which must be regarded as having been mild small-pox, is discussed at length on pages 44 and 45. From the evidence there given it must be concluded that there was at least one case of small-pox in Adelaide amongst the resident population, and the possibility that there were other cases cannot be overlooked in the light of the statements made by the President of the Board of Health, and also of the frequent mistakes in diagnosis made in the various colonies whenever small-pox appeared.

SMALL-POX IN SOUTH AUSTRALIA.

There is an authoritative statement which was made by Dr. Patterson at the Australian Sanitary Conference in 1884 (p. 44) to the effect that small-pox had never obtained a footing in South Australia, with the single exception of the small outbreak at Border Town, due to a case imported from Victoria, and this outbreak was limited to three persons. This statement ignores the case in 1882, but the events surrounding that occurrence are such that it may not be ignored.

SMALL-POX AT BORDER TOWN IN 1884.

The following details are taken from an account of this limited outbreak, which was contributed by Dr. Lendon to the *Australasian Medical Gazette* (Dec. 1884, p. 61). Dr. Lendon first draws attention to the fact that in April, 1884, the R.M.S. *Rome* arrived in Melbourne with a female passenger convalescing from small-pox. Shortly afterwards some fresh cases occurred in Melbourne and subsequently in South Australia and New South Wales. Similarly the inference here drawn is that these cases, which occurred at Border Town, were the result, direct or indirect, of this introduction by the *Rome*. Jesse Collings, aged 22, an epileptic, who had recently left Traralgon, in Gippsland, Victoria, stayed in Melbourne (this should be probably Port Melbourne), at the hotel facing the old Sandridge wharf, from 30th June to 2nd July, and then left by the s.s. *Claude Hamilton*, arriving at Kingston in the south-east of South Australia on the 5th. He spent one night at Kingston, and the next day commenced a tramp of 150 miles along the railway line. This tramp was completed in a week. On 13th July he was taken ill and found wandering about in a state of delirium near a railway camp 13 miles distant from Border Town. At night he was maniacal and required to be held down, and on the next day, 14th July, he was arrested by the police as a lunatic and taken to the Border Town police station. The description given by Dr. Lendon of the subsequent course of the illness is a typical description of severe confluent small-pox. The rash first appeared on the third day of his illness, *i.e.*, 15th July. After a prolonged illness this patient lived, being very severely scarred.

Mounted-constable Brice, aged 28, was taken ill on the fourteenth day from his first coming in contact with Collings. His case proved to be one of variola, modified by vaccination, the attack being slight and convalescence rapid.

Mounted-constable Thornton, aged 31, arrested Collings on 14th July, and was taken ill with shivering and other febrile symptoms a fortnight later. His case also proved to be one of modified variola. There is no statement whether this patient was or was not vaccinated.

At first Dr. Penny attended the cases, but he did not arrive at any positive diagnosis. He isolated Collings, but the constables went about the town as usual, and when Brice was taken ill he went to the boardinghouse in the town, where they subsequently burnt the bed clothes, and took other precautions.

On 2nd August, Dr. Parker arrived and established vaccination—Brice being ordered back from the town. Dr. Parker thought the case to be “aggravated chicken-pox” but subsequently came to the conclusion that they were instances of what is known as “native-pox.” On 8th August Dr. Lendon relieved Dr. Parker, and quarantine was kept up till 30th August, but Collings remained in custody till 16th September, as he had not completed desquamation.

It is interesting to note that the navvies of the railway camp remained entirely free from the disease which is usually infectious from the appearance of the rash, but that on the twelfth day after its appearance one of the constables was taken ill, and on the thirteenth day the second constable. The usual precautions were taken to prevent the spread of the disease and to disinfect the premises, and none of the other inmates of these premises, which at the time numbered 50 altogether, was attacked by the disease.

Dr. Lendon concludes his account with the following remarks:—

It seems somewhat humiliating that in all three colonies the same mistake should have been committed of not recognising a case of small-pox until the infection had been allowed to spread, and it is the more unfortunate since the results in some instances have been fatal. I think you will all agree with me that a well-marked case of confluent small-pox, such as that which I have narrated, ought never to have given rise to any doubt. I could not, at first, understand how chicken-pox (a disease of childhood and most rare in adults) could have been diagnosed, but the President of the Central Board of Health—Dr. Whittell—has thrown some light upon this point. He informs me that in these colonies the laity and many of the profession use the term chicken-pox to denote vaguely any form of pustular eruption which is not small-pox, and that when they designate a disease chicken-pox, they do not necessarily mean true varicella, and moreover, that they often use the term “native-pox” in precisely the same sense. The cases of so-called native-pox which Dr. Whittell has seen and which were not chicken-pox, appeared to him to closely resemble the disease first described by the late Dr. Tilbury Fox as *impetigo contagiosa* (the Porrigo of other writers), the course of the disease being generally chronic—the spots coming out in groups and being contagious. Occasionally he has seen the disease run a sub-acute course, and in one instance it was followed by albuminuria; but he has never seen it behave after the manner of acute infectious diseases.

As far as the source of infection in this small outbreak is concerned, Dr. Lendon leaves it somewhat indefinite. But it appears, from other sources, as if it might be simple enough. The name of the original patient was Collings, and he came from Traralgon on 30th June or thereabouts. In the Report of the Central Board of Health, Victoria, on the cases of small-pox which had occurred in Victoria in 1884 there are specified two cases which both occurred about the same time at Traralgon, and both had C. as the

initial letter of their surname. Probably they belonged to the same family, and they are reported to have occurred in the first week of August. It is fairly justifiable to assume therefore that this man Collings was either a member of the same family or contracted his infection from the same source.

In the Annual Report of the Central Board of Health of South Australia (1884-5, p. 7) the following remark occurs:—

Although some of the other inmates of the (Police) Station showed suspicious symptoms, the disease was confined to these (two) patients.

The expenditure by the Government of South Australia in suppressing this epidemic was £497. (*Australasian Medical Gazette*, 1897, p. 257).

In August, 1887, a case of suspected small-pox was reported at Hog Bay, South Australia. It proved to be a case of erysipelas.*

On 6th January, 1888, Dr. C. reported that he had under his care a case of modified small-pox. The Board despatched Dr. Richardson, who had had experience of small-pox in England, to investigate the case, which proved to be impetigo contagiosa, and not small-pox.*

In October, 1889, the s.s. *Yarra* arrived at Adelaide under circumstances which have been described elsewhere (p. 89). The case of "gastric fever" which ultimately proved to be one of small-pox, infected the servant in the house in which he was staying. No further cases resulted, all the necessary measures of isolation, disinfection, &c., having been taken when the "gastric fever" patient's real illness was recognised, and therefore before the servant became ill. The servant had never been vaccinated and had washed some of the patient's body linen on his coming from the ship.

The cost to the State in this instance was £498.—(*Australasian Medical Gazette*, 1897, p. 257.)

Small-pox, then, was known to have existed in South Australia in 1882, 1884, 1889, but in no instance did the disease assume anything like epidemic prevalence. As has been discussed, it is not unlikely that there were unrecognised cases in Adelaide in 1882, but of this there can be now no measure of certainty. It is clear, however, that South Australia has never had to record a serious epidemic of the disease.

* Annual Report South Australian Central Board of Health, 1887-8, p. 12.

CHAPTER VIII.

SMALL-POX IN QUEENSLAND.

SMALL-POX IN QUEENSLAND, 1892.

There is no record of any case of small-pox having occurred amongst the resident population of Queensland until 1892, when a quarantine official, resident in Queensland, contracted the disease from one of the *Oroya* passengers. This man was isolated and the disease did not spread any further.

No other outbreaks recorded in Queensland.

CHAPTER IX.

SMALL-POX IN THE NORTHERN TERRITORY.

THE NORTHERN TERRITORY.

On 30th September, 1887, the Port Darwin Local Board of Health reported an outbreak of small-pox at Palmerston. One patient, and four other persons who had been in contact with him, were, under instructions from the Central Board of Health in Adelaide, placed in quarantine. Subsequently another patient was found in the bush, and was removed to quarantine. All communication between the affected persons and others was cut off. On 22nd August, an Officer of Customs developed small-pox, and was placed in quarantine. The Health Officer made every effort to discover how the disease was introduced into Port Darwin, but failed, owing probably to the obstinate reticence of the Chinese. The Board, however, felt satisfied that the infection came in one of the ships (probably the *Port Victor*) bringing Chinese passengers.—(*Annual Report South Australian Central Board of Health*, 1887–8, p. 11) (*see also* p. 102).

In the *Australasian Medical Gazette* of August, 1887 (p. 290), it is reported that—

Small-pox has broken out at Palmerston, Port Darwin; seven Chinamen have been quarantined. Every precaution has been taken to prevent the spread of the disease.

The only other reference to small-pox in this part of Australia is the statement by Dr. Ramsay Smith, in his *Report on Hygiene in the Northern Territory* (1906), as follows:—

Small-pox.—There is no doubt that small-pox has caused extensive ravages among the blacks in many parts of the Territory, as in other parts of Australia. Its introduction has been ascribed to the Malays and people from various East Indian islands, who have for the past 300 years visited the river mouths and other parts of the coast when engaged in pearling and fishing for *bêche-de-mer*. A good deal of blindness among natives is attributed to this disease. This theory of its origin, like theories of the origin of syphilis, is not above suspicion when one considers that traces and effects of small-pox have been recorded among tribes even in Central Australia, where no communication had ever before been known with white people.

It is rather remarkable that the Northern Territory, although so close to Asia, and containing such a large proportion of Asiatics in its population as it does, should in recent times have escaped infection by small pox almost entirely. No satisfactory explanation offers itself.

CHAPTER X.

VESSELS ARRIVING IN AUSTRALIAN WATERS WHICH HAVE BEEN INFECTED WITH SMALL-POX DURING THE VOYAGE, OR WHICH WERE INFECTED ON ARRIVAL.

It has been found necessary to divide these vessels into several groups. In the first group have been placed those vessels which have arrived at, and been quarantined or otherwise dealt with at, a single port in Australia. These have been again subdivided according to the various States concerned. The information concerning the vessels dealt with hereunder has been collected from various sources, official and other. Records of the Quarantine Stations, Reports of Health Officers, and contemporary unofficial journals have all been searched. There have doubtless been other vessels which should have been included, but the list is as complete as it could be made with the opportunities available.

A.—VESSELS QUARANTINED AT SYDNEY FOR SMALL-POX.

1. 26th July, 1828.—*Bussorah Merchant*. The first vessel to arrive in Australian waters infected with small-pox (if the First Fleet and La Perouse's fleet be excepted—and in these the evidence of infection is very much more than doubtful), was the convict ship *Bussorah Merchant*. The following references to this vessel are known:—

Colonial Advocate, 1st September, 1828 (published in Hobart), pp. 342-3.—“It appears, by the late Sydney papers, that on board the transport ship *Bussorah Merchant*, which arrived at Port Jackson on the 26th of July, several cases of small-pox had occurred during the passage from England—a circumstance unprecedented since the formation of the Colonies. On the arrival of the vessel, a report thereof was made to His Excellency Governor Darling, by several Medical Officers who had been sent out on board for the purpose of inquiring into the circumstances. In consequence of the report these gentlemen made, it was judged expedient that all communication between the ship and the shore should be strictly prohibited. The ship was therefore instantly removed to Neutral Bay, under quarantine, until the infection should be completely removed. This promptitude manifested by General Darling called forth the most fervent commendation of the community. His Excellency issued (on a Sunday) a Proclamation to the above effect, immediately after the arrival of the vessel. It seems that the whole of the prisoners were removed on shore, on a point of land, but that neither blacks nor whites had been permitted within gunshot of the ship or of the encampment where the prisoners were remaining when the *Phœnix* left Port Jackson for this Colony.”

Howe Australian Almanack, 1829.—“1828—The small-pox introduced by the transport ship *Bussorah Merchant*, 26th July, but its spread was happily obstructed by the prompt and decisive steps pursued by His Excellency General Darling.”

Sydney Gazette, 20th August, 1829.—“It is a singular coincidence that about this time twelve months, the whooping-cough and (almost) the small-pox were brought to this Colony by a prison ship.”

2. August, 1830.—“The *Mermaid* arrived. Two cases of small-pox had occurred while the vessel was in the British Channel. There was no vaccine matter in the Colony.”—(*Sydney Gazette*, 5th August, 1830).

3. In February, 1833, the ship *Prince Regent* arrived at Port Jackson, from England, with emigrants and a general cargo; she was immediately placed under quarantine, on account of the small-pox having occurred at two distinct periods on board the vessel during the passage. The vessel was not released from her unpleasant situation until the commencement of March, having been, previous to her release, thoroughly fumigated, and the clothes of all the infected persons burnt and washed at the quarantine station, before being admitted into the Cove of Sydney.

4. September, 1853.—The brig *Director* was placed in quarantine in Sydney with cases of small-pox on board. No further details are available.—(*Pamphlet on Vaccination*, by Richard Greenup, M.D., Sydney, 1859).

5. 1854.—*Marchioness of Londonderry*. No particulars available.

6. 1855.—*Juno*. Ship of war, from Singapore. Small-pox on board. No deaths.
7. 1855.—*Sultana*. Small-pox on board. No deaths.
8. 1855.—*Constitution*. Arrived 27th May from United Kingdom. Passengers, 371 ; crew, 40. There were four cases of small-pox during the voyage and a total of altogether thirteen deaths either during the voyage or at the Quarantine Station. Detained 64 days.
9. 1855.—*Mangerton*. Arrived 29th July from United Kingdom. Passengers, 362 ; crew, 42. Six cases small-pox," but no further particulars. Detained 40 days.
10. 1855.—*Chowring Ree*. Arrived 16th November from United Kingdom. Passengers, 331 ; crew, 48. There were four cases of small-pox, one of which died at the Quarantine Station. No other particulars. Detained 16 days.
11. 1855.—*Queen of England*, from Southampton, a Government emigrant vessel ; had small-pox, but no deaths, during the voyage. Detained twelve days. No other particulars.—(Report of Medical Officer, Port of Sydney, 1856).
12. 1855.—*Bengal*, from Southampton, a Government emigrant vessel ; had small-pox, but no deaths, during the voyage. Detained 30 days. No other particulars.—(Report, Medical Officer, Port of Sydney, 1856).
13. 1856.—*David McIver*. Arrived 22nd February, from United Kingdom. Passengers, 358 ; crew, 35. Two deaths from small-pox during the voyage and one at the Quarantine Station. No other particulars. Detained seventeen days.
14. 1856.—*Godfrey*. Arrived 8th March, from United Kingdom. Passengers, 145 ; crew, 15. Six deaths from small-pox during voyage, one death at Quarantine Station. Detained fifteen days. No other particulars.
15. 1856.—*Ben Nevis*. Arrived 6th July, from United Kingdom. Passengers, 335 ; crew, 36. Ten cases of small-pox, with one death during the voyage. Detained nine days.
16. 1856.—*Ellen Baird*. Arrived 10th August, from United Kingdom. Passenger, 1 ; crew, 16. One case small-pox. No further particulars. Detained three days.
17. 1856.—*Lloyds*. Arrived 4th September from United Kingdom. Passengers, 434 ; crew, 52. Two cases small-pox. No other particulars. Detained six days.
18. 1857.—*John and Lucy*. Arrived 6th May from United Kingdom. Passengers, 406 ; crew, 54. Three cases small-pox on the voyage. No other particulars. Detained eight days.
19. 1857.—*Macduff*. Arrived 22nd June from United Kingdom. No passengers, 14 crew. Two cases of small-pox during the voyage.
20. 1858.—*Arnim*. Arrived 9th March from Bremen, *via* Cape Town. Passengers, 198 ; crew, 28. One case of small-pox. This was a German immigrant ship.
21. 1860.—*Haunah More*. Arrived 6th May from United Kingdom. Passengers, 372 ; crew, 46. Three cases.
22. 1863.—*Spitfire*. Arrived 23rd August from United Kingdom. Passengers, 441 ; crew, 56. No particulars.
23. 1864.—*Eltrick*. Arrived 20th April from United Kingdom. Passengers, 4 ; crew, 54. Captain died of small-pox. No other particulars.
24. 1865.—*Cape Horn*. Arrived 24th July from United Kingdom. Passenger, 1 ; crew, 25. Eight cases of small-pox were treated at the Quarantine Station.
25. 1867.—*Prince George*. Arrived 11th February from United Kingdom. Seven cases small-pox. No other details.
26. 1868.—*Vapur*. Arrived 26th August from Batavia. Three cases of small-pox landed at Quarantine Station. No other particulars.
27. 1868.—*Kaikoura*. Arrived 22nd December from Panama. Three cases landed at Quarantine Station.
28. 1870.—*Kate Kearney*. Arrived 30th April from Nicol Bay, Western Australia. Twenty-six cases of small-pox had occurred during the voyage, of which six had been fatal. Sixteen were landed at the Quarantine Station (*Australasian Medical Gazette*, 1870, p. 81). (This vessel came from a pearling expedition off the coast of Western Australia, although there is no record of her exact movements. It may be of importance, however, that small-pox was epidemic in the North-western Districts of Western Australia about this time.)
29. A case of small-pox occurred on board the ship *Carlisle Castle* about two months before her recent arrival at Sydney from London.—(*Australasian Medical Gazette*, 1870, p. 265).
30. 1871.—*Glenlora*. Arrived 10th February from London. One death at the Quarantine Station. No other details.
31. 1872.—*Hero*. Arrived from New Zealand, *via* Newcastle on 8th July. One death at the Quarantine Station. (For further particulars, see p. 42.)
32. 1876.—*Australia*. Arrived 16th August from London. One case of small-pox during the voyage.
33. 1876.—*Brisbane*. Arrived 12th December from London. One case during the voyage, three cases (with one death) occurred at the Quarantine Station.

34. 1877.—*Australia*. Arrived 4th January from London. One case on board on arrival at Sydney. The case terminated fatally.

1877.—*Sappho*, *Wolverine* and *Conflict* quarantined January 25th, 31st and 31st respectively. For particulars of these three vessels, see p. 10.

35. 1877.—*Portia*. Quarantined 16th June. No details.

36. 1877.—*Somerset*. Arrived 23rd October from London. No further particulars.

37. 1878.—*City of Sydney*. Arrived 9th March from London. One case during the voyage.

38. 1878.—*Bowen*. Arrived 10th June from London. No details.

39.—*Bussorah Merchant*.—*Heaton's Dict. of Dates* (p. 259) states that this vessel arrived 26th July, 1878. This is probably a misprint for 1828 (see No. 1, p. 77), but it is nevertheless included here.

40. 1879.—*Somerset*. Arrived 4th March from London. No details.

41. 1880.—*Crusader*. Arrived 18th February from China. Quarantined 42 days on account of "water-pox." (This may have been chicken-pox, but in view of the uncertainty and the length of the quarantine period, it has been included here).

42. 1880.—*Brisbane*. Arrived 24th March from Hong Kong with 260 Chinese passengers. One case of small-pox.

43. 1880.—*Java*. Arrived 16th June from Hong Kong with 249 Chinese passengers on board. One case of small-pox. No details.

44. 1881.—*Brisbane*. Arrived 24th January from Hong Kong with 181 Chinese passengers. One case. No details.

45. 1881.—*Brisbane*. Arrived 29th April from Hong Kong. One case of small-pox. No other particulars.

46. 1882.—*Gunga*. Arrived 21st August, 1882, from Fiji. 47 passengers. Quarantined for small-pox. No other details. (See also p. 21.)

47. 1883.—*Menmuir*. Arrived 10th February from China. 162 European and Chinese passengers. One Chinaman suffered from small-pox. No other details.

48. 1885.—*Oceanien*, from Marseilles. About ten to twelve days out from Marseilles, one of the crew developed small-pox. After being in Sydney a few days, a case was reported, and inquiry revealed two others of the crew with half-healed eruptions. Four cases in all.—(*Trans. Roy. Soc., N.S.W.*, 1886, p. 357.)

In the Annual Report of the Victorian Board of Health, 1st June, 1886, occurs the following remark:—"No small-pox has been detected in Victoria during the past twelve months, though there is strong reason to believe that a seaman belonging to the steamer *Gunga*, from Sydney, was suffering from small-pox during a brief visit to Melbourne" (p. 12).

49. 1886.—*Oceanien*. Arrived 15th September from Marseilles. Had had three cases small-pox on board—a first-class passenger, an officer, and the chief cook. These cases occurred on 9th and 10th August, about twelve days after leaving Marseilles. They were isolated on board, the passengers disembarked at Réunion, and the other two cases remained on board. No further cases developed.

50. 1887.—"Four cases of small-pox have occurred on board the *Tsinan*, from Hong Kong, which arrived in Sydney on 19th August."—(*Australasian Medical Gazette*, September, 1887, p. 317.)

51. 1887.—*Cloncurry*. Arrived on 31st December from Foo-chow. 41 European and Chinese passengers, 46 crew. A case had been landed at Sourabaya on 8th December.

52. 1888.—*Whampoa*. Arrived from Hong Kong on 30th January. 38 passengers, 56 crew. Had landed two cases small-pox at Port Darwin. No further cases occurred.

53. 1888.—*Mariposa*. Arrived 9th February from San Francisco. 55 passengers 102 crew. One case of small-pox on board on arrival.

54. 1888.—*Tsinan*. Arrived 13th February from Hong Kong. 137 passengers, 75 crew. Landed five cases at Port Darwin. No further cases developed after arrival at Sydney.

55. 1888.—*Tannadice*. Arrived 26th February from Hong Kong. 43 passengers, 36 crew. Landed one case on arrival at Sydney.

56. 1888.—*Guthrie*. Arrived 28th February from Hong Kong, with 88 passengers, 59 crew. One case of small-pox landed on arrival at Sydney.

57. 1888.—*Moyana*. Arrived 15th March from Hong Kong. 88 passengers, 64 crew. One Chinese had died from small-pox during the voyage, and the disease was still on board on arrival at Sydney.

58. 1888.—*Airlie*. Arrived 24th March from Hong Kong. 159 passengers, 63 crew. Had landed a case of small-pox at Singapore. On arrival at Sydney no further cases had occurred.

59. 1889.—*Guthrie*. Arrived 13th April from Hong Kong. 36 passengers, 58 crew. Three cases of small-pox on arrival at Sydney.

60. 1890.—*Sikh*. Arrived from Japan, *via* Hong Kong on 23rd February. One passenger, 61 crew. Four cases of small-pox had occurred on board.

61. 1891.—*Victoria*. Arrived 25th January from London, *via* Suez. 37 passengers, 254 crew. A supposed case of modified small-pox on board.

1891.—*Guayacan*. Arrived 8th April from Valparaiso, *via* Newcastle, New South Wales. Supposed case of small-pox had been buried at sea; another supposed case present upon the arrival of the vessel. Diagnosed by Dr. Thompson as chicken-pox.

62. 1891.—*Mount Stewart*. Arrived 30th August from Glasgow direct. No passengers, 28 crew. There had been five cases of small-pox during the voyage, one of which terminated fatally. The first case occurred on 28th May and the last on 19th July. There were no cases on arrival at Sydney.

63. 1892.—*Low Wood*. Arrived 13th February from Rio Janeiro. No passengers, 15 crew. The cabin boy had suffered from modified small-pox during the voyage. No other particulars.

64. 1893.—*Taiyuan*. Arrived 7th February from Japan and China. Ten passengers, 83 crew. Small-pox had occurred during the voyage between Japan ports and Hong Kong. Between 28th December and 7th January, there occurred eight cases amongst Japanese passengers. Two were landed at Nagasaki on 31st December, two at Hong Kong 1st January, one on 6th January, and three on 7th January. All the Japanese passengers left the vessel at Hong Kong on 9th January, and thereafter no sickness occurred.

65. 1893.—*Tsinan*. Arrived 23rd February from Hong Kong. Five passengers, 94 crew. Two cases of small-pox amongst Japanese were landed at Hong Kong. No record of any cases subsequently.

66. 1893.—*Ching-tu*. Arrived 8th August from Hong Kong, *via* ports. 35 passengers, 113 crew. One case small-pox landed at Thursday Island, one case on arrival at Sydney, and one case subsequently developed at the Quarantine Station.

67. 1894.—*Taiyuan*. Arrived 14th May from Kobe, *via* Hong Kong. Thirteen passengers, 120 crew. One case (Chinese) of small-pox on arrival at Sydney. Patient died. No subsequent cases.

68. 1895.—*Duneraig*. Arrived at Newcastle in January with three passengers and 25 crew. A case of small-pox was on board on arrival at Newcastle. The patient and rest of ship's company were brought to the Quarantine Station at Sydney by the steam tug *Goohea*, and arrived at the station on 12th January. No further cases developed.

69. 1895.—*Thetis*. Arrived at Newcastle in November with three cases of small-pox on board. No further cases occurred.

70. 1895.—*Edenballymore*. Arrived Newcastle in November with two cases of small-pox on board. No further cases occurred.

71. 1896.—*Beechdale*. Arrived at Newcastle in January. No passengers, 21 crew. First mate and apprentice were recovering from small-pox. No further cases occurred.

72. 1901.—*Ching-tu*. Arrived 26th April from Taku, *via* Hong Kong. 413 passengers, 74 crew. This vessel was acting as a transport returning to Australia with Naval Contingents. There was one case of small-pox on board on arrival, and subsequently six others developed on the Quarantine Station. One of these was fatal.

73. 1902.—*Orient*. A troopship. No passengers, 157 crew. Arrived 17th August from Durban, *via* Albany, Melbourne, and New Zealand. No details are forthcoming except that small-pox had occurred on board. No case occurred in Australian waters.

74. 1902.—*Moraviau*. Arrived 27th October from London, *via* Cape Town, with 101 passengers and 93 crew. A case of small-pox had been landed at Cape Town. No case occurred in Sydney.

75. 1904.—*Empire*, from Japan, *via* Ports. Arrived 3rd June. 128 passengers, 97 crew. Landed a small-pox patient at Townsville. No further cases.

76. 1905.—*Tsinan*. Arrived 21st December from Japan and China. 65 passengers, 70 crew. One Malay sailor with small-pox landed at Quarantine Station. No other cases.

77. *Fultala*, carrying Indian mails to Fiji, came on to Sydney with a case of small-pox on board.

78. 1906.—*Pathau*. Arrived 17th December. No passengers, 60 crew. Malay quartermaster with small-pox landed at Quarantine Station. No other cases.

79. 1907.—*Elsa*. Arrived 31st December from Japan and China. No passengers, 42 crew. One case landed on arrival at Quarantine Station. No other cases.

80. 1908.—*Nikko Maru*. Arrived 12th February from Yokohama. 34 passengers, 129 crew. Small-pox occurred during the voyage. No further cases after arrival at Sydney.

81. 1908.—*Empire*. Arrived 13th February from Japan and China. 68 passengers, 103 crew. Small-pox occurred during the voyage. No cases after arrival at Sydney.

82. 1908.—*Aldenharn*. Arrived 19th April from Japan *via* ports. 108 passengers, 86 crew. Case of small-pox landed on Thursday Island. No cases subsequently.

83. 1908.—*Oceanien*. Arrived 6th October from Marseilles. 43 passengers, 173 crew. Case of small-pox landed Colombo. No record of further cases.

84. 1908.—*Falls of Orchy*. Arrived 6th December from Manila. No passengers, 51 crew. Small-pox had occurred during the voyage, but no cases occurred after arrival at Sydney.

85. 1909.—*Empire*. Arrived 20th April from Hong Kong *via* Timor. 113 passengers, 97 crew. Small-pox occurred on the voyage, but no cases after arrival at Sydney.

B.—VESSELS QUARANTINED AT MELBOURNE FOR SMALL-POX.

86. 1857.—9th May, *Morning Glory*. Two persons landed. Detained two days. Port of departure, Liverpool.

87. 1857.—26th June, *Ocean Chief*. 336 persons landed. Detained 22 days. Port of departure, Liverpool.

88. 1857.—8th October, *Commodore Perry*.* One person landed. Detained 22 days. Port of departure, Liverpool.

89. 1858.—21st March, *Tornado*. 270 persons landed. Detained six days. Had had small-pox on board, but there is no record to show how recently before arrival at Melbourne. Port of departure, Liverpool.

90. 1858.—7th May, *Black Swan*. 50 persons landed. Detained six days. Had had small-pox on board, but there is no record to show how recently before arrival at Melbourne. Port of departure, London.

91. 1859.—4th July, *Tudor*. 211 persons landed. Detained ten days. During the voyage there had been 25 cases of small-pox on board, two of which were fatal. These 25 individuals were treated in their berths, and went through all the stages of the disease there; there was no seclusion or separation of the sick from the healthy made or attempted. Some of the passengers stated that in passing to or from their berths they could not avoid coming in actual contact with persons in all stages of the eruption.—(Extract from the Report of the Surgeon-Superintendent at the Quarantine Station). Port of departure, Liverpool.

92. 1859.—21st August, *Morning Light*. 395 persons landed. Detained five days. In connexion with small-pox on this ship there is a fact remarkable and worthy of record. One of the sailors fell ill early in the voyage with what turned out to be confluent small-pox. As soon as the disease was ascertained, he was confined to a canvas house on deck, open on one side at top. The sailors in a body waited on the captain, and remonstrated on the exposure to which their comrade was being subjected. The captain's reply was that he understood well what he was about; that he hoped both to save the sick man, and to prevent the disease spreading. On board the *Morning Light* were 319 passengers and 76 crew, yet so right and efficacious were the measures adopted by her captain and doctor, that the man's life was saved, and there was no second case of small-pox. Port of departure, Liverpool.

93. 1860.—21st April, *Red Jacket*. This vessel had on board one case of small-pox which occurred during the voyage and was not quite convalescent on arrival at Melbourne. No person was landed on the Quarantine Station, all being kept on board for four days. Port of departure, Liverpool.

94. 1861.—12th March, *Donald Mackay*. The number of passengers on this vessel was 333, and of crew 86. All were landed in quarantine. The passengers were detained from 25 to 64 days. During the voyage there had been ten cases of small-pox, with no deaths, and at the Quarantine Station there were ten further cases, with no deaths. The patients consisted of one saloon passenger, sixteen intermediate and steerage passengers, and three sailors. Port of departure Liverpool.

95. 1862.—14th June, *Wilhelmine*. Landed eleven crew, no passengers. This vessel was from Foo-Chow-Foo, and early on the voyage the cook was attacked with small-pox. The journey occupied 62 days, and the cook was nearly convalescent on arrival at Melbourne. No other cases developed, and the cook was released from quarantine after thirteen days. The vessel was a cargo boat and carried no passengers.

96. 1864.—3rd June, *Snapdragon*. This vessel was from Hong Kong and carried 286 passengers and eighteen crew. The records are not complete, but apparently there were altogether six passengers and three crew attacked with small-pox. The vessel was released after nine days, and the passengers after between 29 and 31 days.

97. 1865.—4th August, *London*. This vessel was from London and carried 200 passengers and 100 crew. Six cases of small-pox had occurred amongst her crew during the voyage, but the records do not state at what stage of the voyage. Upon arrival at Melbourne all the ship's company were released with the exception of those (six in number)

* This is the vessel which was responsible for the epidemic of 1857 in Melbourne.

who refused vaccination. These six persons were landed at the Quarantine Station and released after they had consented to be vaccinated.

98. 1866.—19th February, *Rosina*, from Macao. 347 Chinese passengers and 20 crew. A fatal case of small-pox had occurred on board shortly after leaving China, and subsequently nineteen other deaths had occurred. These latter nineteen deaths are attributed in the official report to the deprivation of opium. No person was ill on arrival at Melbourne, and the total detention was 48 hours.

99. 1866.—27th March, *Western Ocean*, from Liverpool. 265 passengers and 39 crew. Had had two cases of small-pox during the voyage. No further cases occurred, and there was no case on board when the vessel arrived at Melbourne. All on board were vaccinated, and the vessel released.

100. 1866.—20th July, *Tornado*, from Liverpool. 379 passengers, 52 crew. The vessel arrived at Melbourne with small-pox on board and one person very ill with the disease, and six others convalescent were landed at the Quarantine Station. On the fifth day of detention, after an inspection had revealed that all on board were well, the vessel and all on board were released. Four days after the vessel had been thus released the surgeon of the vessel reported that a mild case of small-pox had appeared, and the vessel was again placed in quarantine. The vessel was finally released on 18th August, some of the passengers being detained until the 31st.

This vessel is noteworthy as it is quoted in connexion with the cases of "chicken-pox" which occurred at Geelong. (*see* p. 29). There are no details to show whether any of the passengers had communication with the shore during the interval between the two occasions when the vessel was in quarantine.

101. 1867.—30th April, *Berengaria*, from Hong Kong. No passengers, twelve crew. Three cases of small-pox had occurred during the voyage, one of which had been fatal. There is no record of the stage of the voyage at which these cases had occurred, but there were no cases on arrival at Melbourne, and after three days' detention, during which all on board were vaccinated, the vessel was released.

102. 1868.—13th November, *Balmacara*, from Batavia. Two passengers, twelve crew. Had had two cases of small-pox during the voyage. There were no cases on arrival at Melbourne. Detained three days. No further cases occurred.

103. 1868.—29th November, *Ivonvale*, from Foo-Chow-Foo. Three passengers, eleven crew. During the voyage the carpenter and one of the seamen died. The records do not specify whether the disease was definitely small-pox, but, as stated in the account of the epidemic presumably caused by this vessel, Dr. McCrac, as a result of his inquiries, came to the conclusion that one, at least, of these two had died from small-pox. Five days after the vessel's arrival at Melbourne, her chief mate was admitted to the Melbourne Hospital, suffering from small-pox. No further cases occurred. Detained thirteen days.

104. 1869.—6th July, *Furness Abbey*, from London. Fourteen passengers, 33 crew. This vessel had had small-pox on board during the earlier part of the voyage. Her detention, which lasted five days, was caused principally by the refusal of the sailors to be vaccinated. On the fifth day they gave in, and submitted to the operation, and after all on board were vaccinated the vessel was allowed to go forward.

105. 1870.—25th June, *Star of Peace*, from London. Ten passengers, 30 crew. One case of small-pox occurred during the voyage. The case was quite convalescent upon arrival. No further cases occurred. Detention two days.

106. 1871.—15th January, *Queen of the Thames*, from London. 160 passengers, 120 crew. One sailor had had small-pox during the voyage. Quite recovered on arrival at Melbourne. No further cases. Detained six hours.

107. 1871.—7th March, *Superb*, from London. 41 passengers, 50 crew. One sailor had had small-pox during the voyage. Quite recovered upon arrival at Melbourne. No further cases. Detained twelve hours.

108. 1871.—11th October, *Norfolk*, from London. 90 passengers, 52 crew. One sailor had had small-pox during the voyage. Quite recovered on arrival at Melbourne. No further cases. Detained four hours.

109. 1871.—22nd May, *Somersetshire*, from London. 133 passengers, 97 crew. Of the passengers 72 were in the third class. Almost at the outset of the voyage one of the seamen fell ill of small-pox, and after a long interval of time had elapsed, another of the crew took the disease. Subsequently two of the third class passengers were attacked, the last case occurring only 48 hours previous to the arrival of the vessel at Melbourne. A new case of small-pox occurred among the third class passengers when they had been eleven days at the Quarantine Station. No other cases occurred. Detained from fourteen to 52 days.

110. 1877.—1st April, *Bangalore*, from Bombay, *via* Colombo. 133 passengers, 125 crew. The second engineer was ailing when the vessel left Colombo, and the eruption came out on him two days afterwards. He was at once transferred to the bridge-house

and there strictly isolated. When the vessel reached Albany he was transferred to a hulk there and placed in quarantine. On arrival at Melbourne all on board were vaccinated, and the vessel detained eight days. No further cases occurred.

111. 1877.—6th April, *Linguist*, from Liverpool. 24 passengers, 24 crew. A fatal case of small-pox had occurred on board during the voyage. Some cases of chicken-pox also occurred, the last case being reported as cured upwards of 40 days before the vessel arrived at Melbourne. Detained 24 hours.

112. 1877.—10th August, *Macduff*, from London. 22 passengers, 32 crew. Including passengers and crew the vessel had 57 people on board when the voyage commenced. Of this number, eight were attacked by small-pox, one case ending fatally. The first case occurred only a few days after the ship left London, and the last only five days before she went into quarantine at Melbourne, so that it may be said that the disease was present on board throughout the entire voyage. The disease was of a very bad type, and the steps that were taken to arrest its progress do not appear to have been either wise or active. There was no doctor on board. The disease began in the fore-castle among the coloured seamen, spread to the house on deck amongst the passengers, and finally established itself in the captain's and officers' quarters in the after part of the ship. The captain, second officer, and two seamen were severally attacked within four days of each other, and all four within ten days of reaching Melbourne. These four cases and three convalescents were all landed at the Quarantine Station, and vigorous measures were taken to arrest the disease. On the fourteenth day of their detention, one of the passengers was found to have a papular eruption on the face. This proved not to be small-pox, and after 29 days the passengers were released. The patients were detained 43 days. No other cases occurred.

113. 1878.—31st May, *Siam*, from Bombay, *via* Colombo. No passengers, 170 crew. The vessel had been several days in port, had landed her mails, passengers, and cargo, and was lying alongside the pier at Williamstown (Melbourne) preparing for her outward voyage when three cases of small-pox were discovered on board among the lascars, forming a portion of her crew. She was ordered to the Quarantine Station, and there detained fourteen days, the crew being detained 26 days. There was no further case among the crew.

Although the ship had been alongside the pier for nearly a fortnight, there were no cases reported from on shore.

114. 1880.—11th May, *British Sceptre*, from London. No passengers, 33 crew. A coloured seaman had, five days after leaving London, been attacked with small-pox. Owing, however, to the precautions exercised by the captain, the disease did not spread, and the man had been convalescent 50 days before arriving at Melbourne. No further cases occurred. Detained seven days—the patient and one attendant, however, being detained 30 days.

115. 1882.—6th January, *Garonne*, from London, *via* Cape Town. Passengers, 303; crew, 124. The number of cases which occurred on board this vessel was four, *viz.* :—one death, one landed at Cape Town, and two non-convalescent when landed at the Quarantine Station at Melbourne. The number of cases which occurred at the station was ten—one died of confluent small-pox; the remainder recovered and of these three were nurses. After remaining 56 hours in quarantine, she proceeded to Sydney with 78 passengers and 120 crew. The detention at Melbourne was 63 days.

116. 1882.—25th January, *Mirzapore*, from London, *via* Bombay and Colombo. Passengers, 77; crew, 150. A confluent form of small-pox had broken out on the voyage among the passengers, but no deaths had occurred. This disease was brought on board by the Withers family. The cases attacked were principally those of that family and attendants. As soon, however, as the passengers were landed, seven more cases occurred, and of these two were nurses. No other cases occurred, and the detention was 27 days.

117. 1884.—14th April, *Rome*. Quarantined on account of the existence on board of a case of small-pox.

118. 1884.—24th October, *Carthage*, from England. This vessel had had during the voyage a case of small-pox, which had occurred fourteen days after leaving England, and had been put ashore at Aden.

119. 1890.—*Kelton*, from Rio Janeiro. Arrived at Melbourne on 31st December. The number of the crew is not stated, and apparently there were no passengers. During the voyage nearly all the ship's crew had been attacked with small-pox, one death having occurred from the disease, and six of the company being still laid up on arrival at Melbourne.

120. 1891.—*Loch Tay*. Arrived on 13th August at Melbourne, with twelve cases of small-pox on board. No fresh cases occurred after 16th August. No other information is available.

121. 1893.—*Eddystone*. This vessel had had as one of her passengers from Albany a man who had been discharged from a hospital in Western Australia while still in an

infectious condition from small-pox. This man was one of the cases that occurred during the outbreak in Western Australia (see p. 67). Apparently no cases were infected on board by this man. She arrived at Melbourne during June.

122. 1893.—*Britannia*, from London. Arrived at Melbourne during June, and was quarantined on her arrival owing to the occurrence of two cases of small-pox during her voyage. There occurred no further cases.

123. 1895.—*Cloncurry*. Was quarantined on account of a case of small-pox which was on board on her arrival at Melbourne during January. (A case of small-pox, which subsequently arose in West Melbourne, was traced to infection by articles—or by the man himself—which had been brought from the Quarantine Station, see p. 100).

124. 1895.—*Bhundara*. This vessel arrived at Melbourne during April. A man—the records do not state whether a passenger or seaman—had become ill on 14th March, and the rash of small-pox appeared on 17th March. The vessel had left Calcutta on 3rd March. No further cases appear to have occurred.

125. 1897.—*Nineveh*. This vessel arrived at Melbourne during February, from Liverpool, via Cape Town. She was cleared at the Melbourne Heads and came up to Melbourne and was made fast alongside. It was not until 48 hours after the clearance that it was discovered that there were two cases of small-pox on board, one of them of about three weeks' standing.

The vessel was quarantined with all those who were on board, to the total number of 143. There is no record of any further cases.

126. 1903.—*Angelo Repetto*. This vessel left Marseilles on 17th December, 1902. On 18th December, one seaman had developed small-pox. The patient was isolated on 28th December and kept isolated until 2nd February, when he resumed work. Although he was found, on arrival at Melbourne on 5th March, to be still in an infectious condition, no further cases had occurred among a crew of eighteen. No passengers were carried.

127. 1903.—*Marion Woodside*. Arrived at Melbourne during July. Six seamen had suffered during the voyage from small-pox and one of these had died. The whole of the crew, 23 in number, were quarantined at Melbourne, but no further cases occurred among them.

128. 1903.—26th March, *Runic*. Arrived from South Africa. A case of small-pox had been landed at Cape Town. The incubation period having passed since the landing of the patient, a large amount of vaccination having been carried out successfully, particularly among members of the crew associated with the patient, and disinfection having been apparently thoroughly carried out, and there being no sign of infection among the company, the ship was granted pratique.

C.—VESSELS QUARANTINED AT ADELAIDE FOR SMALL-POX.

The history of the quarantining of vessels at Adelaide is, to a very large extent, merely part of the history of quarantine of vessels in the other States (New South Wales and Victoria), as most of the vessels which call at Adelaide only do so on their way further east. Vessels quarantined under such circumstances will be found described in details on pp. 88–91. Instances are recorded where vessels were quarantined independently at Adelaide. The records of the earlier years are available to only a very limited extent, but the following information has been extracted from various sources—Annual Reports of Central Board of Health, South Australia; contemporary unofficial medical literature, &c.:—

129. Small-pox occurred in the ship *British Enterprise* at Port Adelaide in 1879.—(*Australasian Medical Gazette*, December, 1884, p. 65.)

All patients were removed from the *British Enterprise* on 9th April, 1877. There were two cases of small-pox, four of measles, and two of scarlet fever. On the *British Enterprise* seven cases of small-pox had occurred—six amongst the crew and only one amongst the passengers. In all the cases, the beds and bedding of the patients had been thrown overboard, and the patients isolated as much as possible. The *British Enterprise* was an emigrant ship. The one passenger attacked was a young woman, aged 18. The first case to develop was "that of a Kanaka who had been living in the low parts of London," and after being at sea two or three weeks, he was allowed to sleep in the sailors' berth. His illness proved to be small-pox, and the sailor in whose berth he had slept was the next attacked. The last case occurred ten days before the arrival of the vessel."—(*Annual Report, South Australian Central Board Health, 1876–7*, p. 7.)

130. 1891.—13th January, *Airlie*, arrived from Rio Janeiro. There were on board on arrival two cases of confluent small-pox and another which "the doctor regarded with suspicion." All recovered and apparently no further cases occurred.

D.—VESSELS QUARANTINED AT BRISBANE FOR SMALL-POX.

The history of the quarantine of vessels in Queensland is very largely contained in the records of vessels quarantined in New South Wales by reason of the fact that most of the vessels infected with small-pox called at Queensland ports only on their way to Sydney.

References have, however, been found to three vessels which are not mentioned elsewhere. These are as follow:—

131. 1871.—"The immigrant ship *Shakespeare* lately arrived at Brisbane with six cases of small-pox on board."—(*Australian Medical Journal*, 1871, p. 224; also *New South Wales Medical Gazette*, 1871, p. 346.)

132. 1879.—"A telegram from Brisbane, dated 12th February, says 'virulent small-pox has broken out amongst the passengers by the *Somerset*.'"—(*Australian Medical Journal*, 1879, p. 144.)

1884.—Dr. James, in his presidential address to the Victorian Medical Association on 9th January, 1884, says: "Not long ago a steamer infected with small-pox came down by Torres Straits, landing passengers at port after port."—(*Australian Medical Journal*, 1884, p. 26.)

Possibly this reference may refer to the same ship as the following:—

133. 1883.—"Two fresh cases of small-pox have occurred on board the *Duke of Westminster*, at Brisbane, the patients being the chief officer and a young lady, a second class passenger. The other two patients are doing well."—(*Australian Medical Journal*, 1883, p. 428.) The *Australasian Medical Gazette*, 1883, p. 274, states: "The outbreak of small-pox on board the steamer *Duke of Westminster* has been traced to the presence of two single girls, shipped in London, nine and eleven days respectively after their discharge from the Small-pox Hospital."

134. 1896.—*Duke of Devonshire*. "Small-pox has appeared on the s.s. *Duke of Devonshire*, which arrived at Queensland ports in November."—(*Australasian Medical Gazette*, 1896, p. 539.)

E.—VESSELS QUARANTINED AT HOBART FOR SMALL-POX.

Many records have been searched for references to vessels quarantined in Tasmania on account of their having had small-pox on board. That such did occasionally arrive is plain from the remark by Hall that "ships with passengers to this port (Hobart) have had deaths from this cause during the voyage, but it has never got a footing in the island." (See p. 54). The only definite reference that has been discovered is the following:—

135. 1885.—*Rimutaka* arrived at Hobart having had a case of small-pox in the early part of the voyage."—(*Minutes, Victorian Board of Health*, 10th July, 1885.)

F.—VESSELS QUARANTINED IN NORTHERN TERRITORY FOR SMALL-POX.

136. On 20th January, 1887, the steamer *Ching-tu* arrived at Port Darwin from Hong Kong, having on board 250 persons, of whom about 160 were Chinese coolies—30 for Port Darwin. On inspection, a Chinese passenger was found to have small-pox, the eruption being at apparently the third day. No further cases appear to have occurred at Port Darwin.—(*Australasian Medical Gazette*, April, 1887, p. 175).* This vessel does not appear to have been quarantined at Sydney.

G.—VESSELS QUARANTINED IN WESTERN AUSTRALIA FOR SMALL-POX.

The early records in Western Australia are very incomplete and it is improbable that the following list is at all complete, but it represents all the instances of small-pox on shipboard that could be found in the sources of information available. These sources are the contemporary newspapers and the official records of the Colonial Secretary's and the Medical Departments.

* This account confirmed in Annual Report S.A. Central Board Health, 1886-7, p. 13.

137. 1855.—On the 25th May, the Health Officer at Fremantle reported that the ship *Stag* was boarded that morning, and it was found that there had been fourteen cases of small-pox on board during the voyage, but that none had occurred since 13th March. No further information is available except that the vessel was quarantined until 29th May, during which period no cases appeared, so that it is reasonable to conclude that the outbreak was at an end.

138. 1861.—The *Enquirer and Commercial News* in its issue of the 1st of February, 1861, stated that the ship *Hastings* had arrived from London and that one man had died from small-pox three days after leaving The Downs, and that no further cases had occurred during the voyage.

139. 1873.—The *Enquirer and Commercial News* reported in its issue of 30th April, 1873, that "the English Mail had arrived from Galle with small-pox on board." It further stated that there had been only one case and that the vessel would remain in quarantine. There is no further information.

140. 1893.—The *Saladin*, from Singapore, was the direct cause of the epidemic of small-pox in Perth in 1893. The circumstances connected with this vessel's arrival are detailed on p. 66.

1894.—[In the Annual Report of the Central Board of Health for Victoria appears the statement that two cases of small-pox were landed from the s.s. *Sultan* in this year. No record of this was found amongst the official papers in Western Australia and it is therefore not included in the numbered list, although mentioned here].

141. 1898.—On the 9th July, 1898, a case occurred on the *Sultan*, on her voyage from Singapore to Fremantle. Dr. Maunsell, the Government Medical Officer at Roebourne, who was a passenger on the boat, diagnosed the case as one of small-pox, and the patient—a second-class passenger from Singapore—was immediately isolated, and, except for necessary attendance which was performed by a Malay who had had small-pox, all communication with the patient was prohibited.

The whole of the crew and the officers had been successfully vaccinated three months previously, and the passengers were all vaccinated immediately on arrival at Fremantle, on the 16th July. The patient himself stated that he never had been vaccinated. No further cases occurred.

1898.—*Afric*, from Cape Town, with small-pox on board on arrival at Albany. —(*Australasian Medical Gazette*).

142. 1900.—On the 27th March, 1900, the *Karakatta* arrived at Fremantle after a voyage from Singapore of sixteen days. There was no sickness until the morning of the 27th, when a Malay who had joined the ship seven days before she left Singapore, showed a few spots on his body but did not feel ill. The case was diagnosed by the Quarantine Officer as one of small-pox, and isolated. No further cases occurred, although by reason of some misunderstanding, the isolation was not complete until the 28th. There are no further details on record regarding this vessel and consequently there is nothing to explain the fact that the disease developed only after sixteen days after leaving Singapore. It may have been a case of unusually long incubation, or the patient may have brought with him some infected clothing.

143. 1904.—On 2nd May, 1904, the Quarantine Officer of Broome, Western Australia, reported that the *Sultan* had arrived from Singapore with one of the crew affected with small-pox. There were on board 25 passengers and 68 officers and crew. These were all vaccinated at Broome, but the majority unsuccessfully. These were again vaccinated at Fremantle, with successful results. At Broome, the patient was removed from the vessel and isolated on shore. Subsequently the vessel proceeded in quarantine to Fremantle. No further cases occurred, and the patient was reported quite well on the 16th.

144. 1904.—In 1904 an outbreak of small-pox occurred amongst the Asiatics on board of the pearling fleet which had its head-quarters at Broome, but which was at the time of the occurrence of the first cases some 100 miles or more out at sea.

The first case was discovered on the lugger *Dora* when she arrived at Broome, on 2nd July, 1904. This man was one of the crew, and at the time of his arrival at Broome, had the remains of a well-marked eruption. It is stated in the records that he was quite well and had never felt ill, and also that he had been at some time previously well vaccinated.

This man had been transferred after the commencement of his attack from the schooner *Kalander Bux* to the *Dora*, but there is no evidence to show how long he had been on the *Kalander Bux* before the onset of his attack.

Upon the arrival of the *Dora* the vessel and all her crew were isolated and quarantined on the vessel. Subsequently other cases arose on the lugger, and by the 15th of July three other cases had developed, making a total of four on the lugger at Broome. On that day a fifth case was reported among the quarantined crew.

On the 1st of August, still another case developed, making a total of six on this vessel, and on the same day the schooner *Kalander Bux* arrived at Broome with two other cases on board. The sequence of the dates makes it probable that these two last cases were infected from the original case, rather than that they contracted the disease from the same source as the original case.

Although all the cases affected prior to 15th July were on that date removed to an isolation camp on shore, and although all cases subsequently arising were removed at once to the same camp, only one case developed amongst the inhabitants of Broome, and that case was an aboriginal police boy who showed the first symptoms on 19th July, so that he could not have been infected after the patients were removed on shore.

The source of the infection in this last-mentioned case is obscure, as also is the source of the infection amongst the vessels of the pearling fleet. Having in view the occurrence of the disease on the *Sultan* and the quarantine of cases of small-pox at Broome, from the 4th of May until the 16th of June, it was claimed that the source of the disease in both instances was infection from the *Sultan* cases. It is certain that the police boy was camped quite close to the camp where the *Sultan* case had been isolated when his attack commenced, but there is no evidence to show whether the infecting case in the other group had had any connexion with the *Sultan* case or not.

Dr. Lovegrove, the Principal Medical Officer who investigated the outbreak on the spot, expressed his conviction that the outbreak was due to the *Sultan* case, but gives no evidence in support of that conviction.

The outbreak was stopped by the energetic measures adopted by Dr. Lovegrove. All the necessary equipment was taken from Perth in a Government steamer, and Dr. Lovegrove and his assistants cruised about, visiting each of the pearling fleets in turn, and vaccinated everybody, disinfected all clothing, bedding, &c.; fumigated the ships; and examined all members of the crews. Other than those above detailed, no further cases arose, and this cessation of the epidemic is undoubtedly to be attributed to the complete vaccination performed.

In considering the fact that no cases arose among the white population on shore, it must be borne in mind that the isolation hospital was only 15 chains from the town and 12 chains from the nearest house.

145. 1909.—*Paroo*. On 17th February, 1909, the steamer *Paroo* arrived at Broome with one of the crew, a quartermaster, suffering from small-pox. The vessel had left Singapore on 10th February, having on board mails, cargo, and 66 Asiatics proceeding to Broome under engagement to the owners of the pearling fleets. The patient became ill one day out from Singapore, 11th February. The rash appeared on 15th, and two days later the temperature was normal. (This patient had a temperature of 105 at Sourabaya and had not been identified as suffering from small-pox). The ship's crew and the 66 contract labourers were all certified at Singapore as having been recently successfully vaccinated. On 19th February, the 66 Asiatics were transferred to a schooner anchored in the harbor at Broome, and they all remained there in quarantine until released. The patient was landed on 19th February with two attendants, and died on the 21st. The attendants were then, after disinfection measures, re-embarked in isolation on the *Paroo*. The whole of the ship's company—officers, passengers, and crew—were vaccinated on 21st February, and on 22nd February the *Paroo* left Broome, and proceeded in quarantine to Fremantle. The mails had been landed in Broome on the 19th, and all cargo was carried on to Fremantle, the vessel never having come alongside. These Asiatics, who had been transferred to the schooner at Broome, were all vaccinated, the majority of them bearing marks of recent efficient vaccination. On 7th March, one of these Asiatics became ill, and was landed within the quarantine compound on suspicion. On 10th March this case was diagnosed as variola benigna, and the Asiatics on the schooner were again vaccinated. No further cases developed amongst these Asiatics, and all were released from quarantine and landed from the schooner on 27th March. On 8th April, the patient was discharged from the Quarantine Hospital. The evidences of previous vaccination of the Asiatics, which had been removed on the 19th, may be summarized as follows:—Five of the men showed marks which could be described as good, and 23 marks which could be described as slight. Twenty-six of them showed the remains of vaccination which had been performed at Singapore, while all the others showed good recent marks. No further cases developed either on the schooner or in Broome.

The *Paroo* continued her journey and arrived at Fremantle on 28th February, not having touched at any port except Geraldton, and then only in strict quarantine for the purpose of discharging some cargo.

On arrival at Fremantle there were no cases of small-pox on board. The vessel was placed in quarantine and sent to Owens' Anchorage. On 2nd March three of the crew were isolated on board on account of their being ill. On 4th March, one case of small-pox was landed from the boat at the Quarantine Station at Woodmans, and on 5th March, three more cases were landed. The passengers for Fremantle and the Quarantine

Officer, who had been on board supervising, were all landed at Woodmans, and the vessel, after fumigating at Fremantle, proceeded in strict quarantine to Singapore (calling at Cossack Roads for some cargo).

No further cases were reported, either at the station or on board.

19th March the contacts were released from Woodmans.

28th April the patients were released from Woodmans.

There were no deaths among the patients at Fremantle, but the first case died at Broome.

The vaccination at Broome could not have been effective in those cases which developed at Fremantle, but there is no record to this effect.

146. 1909.—The steamer *Redbridge* arrived at Bunbury, 27th February, 1909, with one case of small-pox on board, and reported the death of the captain during the voyage. The steamer left Calcutta on 6th February. The captain became ill on the 8th, complaining of very severe headache, and he died on the 11th, only a few spots having been noticed on his face. The man who was sick on arrival at Bunbury was a fireman, a European, who first became sick on 15th February (that is the tenth day from Calcutta). The spots first appeared on the 17th, and on arrival at Bunbury the rash was beginning to disappear. He had been vaccinated in early adult life. These two, the captain and the fireman, were the only two of the ship's company affected, and as the boat had been 21 days at sea when she reached Bunbury, there had been time for other, even secondary, cases to arise, and although the whole ship's company was vaccinated at Bunbury, this vaccination cannot have played much part in preventing the spread of the disease. The origin of the small-pox on this ship is very obscure. The vessel had been for some weeks at Calcutta before leaving for Bunbury, to which port she came direct, and it is clear that the captain and the fireman contracted the disease before leaving Calcutta, and it is therefore probable that the two cases arose from two different sources of infection. (As the ship carried no doctor it must remain uncertain whether the captain died from small-pox or not). The patient was isolated on shore at Bunbury and no further case arose.

H.—VESSELS QUARANTINED AT MORE THAN ONE PORT FOR SMALL-POX.

The second group of vessels are those which were at some stage during their voyage infected with small-pox, and which touched at various ports on the Australian coast.

The following is a list of such vessels, as complete as it could be made from the records available.

It should be explained that steamers from Europe usually called at Albany (later Fremantle became the first port of call instead of Albany), Adelaide, Melbourne, and Sydney, in that order, and it is to be understood, unless otherwise stated, that the undermentioned vessels were subjected to quarantine measures in each of the ports called at subsequent to the discovery of the case.

It is necessary to state that the numbers of passengers and crew landed at Sydney do not represent the total numbers on board throughout the voyage, but only those remaining on board after passengers for previous ports had been removed in quarantine at those ports.

It is unfortunate that full details are not forthcoming for many of these vessels. Such facts as are given are all that could be gathered from various sources.

147. 1873.—*Baroda*, from London, *via* Colombo. 92 passengers, 141 crew. Upon the arrival of this vessel on 5th May, one of the crew—a lascar—was found to be ill with small-pox. He was landed with a lascar attendant at the Quarantine Station at Melbourne. 55 first-class and second-class passengers, and two P. and O. servants were also landed, and the vessel left for Sydney on 7th May. No further case occurred amongst the passengers landed at Melbourne. The vessel arrived at Sydney on 9th May, was inspected, and released. Subsequently one case broke out, and this case, with contacts, was isolated at the Quarantine Station. On the journey round to Melbourne the second officer developed small-pox, so that the vessel was again quarantined at Melbourne. No further case occurred in Australian waters, but no record of the subsequent history of the vessel has been found.

148. 1876.—6th March, *Sumatra*. 129 passengers, 123 crew. This vessel was from Bombay, *via* Ceylon. One of the crew—a lascar—was attacked by small-pox on the voyage from Ceylon. This man was recognised as having the disease at an early stage, and prompt measures were taken on board to isolate the patient and prevent the disease from spreading. The *Sumatra* reached Albany on 29th February, and the patient and his attendant were there removed from the ship and quarantined. All passengers and crew were vaccinated (except two second-class passengers). No person was landed on the Quarantine Station, but all remained on board the ship in quarantine for nine days. No further cases occurred.

149. 1886.—20th April, *Chimborazo*. One patient landed at Adelaide. Vessel released 5th May. No further cases developed at Adelaide or Melbourne.

150. 1889.—The s.s. *Yarra*, from France, touched at Albany in 1889 and reported a case of "chicken-pox" on board. This diagnosis was agreed with by the Port Health Officers at Albany and Adelaide. The patient, when examined at Melbourne, was declared to be affected with small-pox and quarantined.

During the voyage between Albany and Adelaide, the cabin-mate of the above patient fell ill with "gastric fever." He went to a boardinghouse in Adelaide and ultimately developed small-pox. He infected the servant in the house (*see* p. 74). No other cases occurred either in the ship or in Adelaide. The vessel proceeded to Melbourne and Sydney, reaching the latter port on 11th November. She was quarantined in both places, but no further cases occurred.

It is noteworthy that each of the two foci in turn infected only one person, and that the person who was brought most intimately in contact with them.

151. 1892.—*Warara*. This vessel arrived at Adelaide on 28th May with a convalescent case of small-pox on board. The patient was landed at Adelaide and quarantine measures imposed at Adelaide, Melbourne, and Sydney. The last-named port was reached on 14th June, 56 passengers and 101 crew being quarantined there. No further cases developed at any of the ports.

152. 1892.—*Karlsruhe*. Arrived at Adelaide on 12th November. There was on board a woman who had suffered from an eruption which had appeared on 22nd October, and was stated by the ship's surgeon to be "prickly heat," but afterwards diagnosed at Sydney as small-pox. On 2nd December a child was reported at Petersburg, South Australia, to be suffering from small-pox. This child had been a passenger by the *Karlsruhe*, but there is no record to show what degree of contact, if any, had occurred between this child and the previous case.

No other cases occurred either on the vessel or among the passengers quarantined at any of the ports or in South Australia.

153. 1893.—The s.s. *Australia* arrived at Adelaide on 4th May, 1893. A few days later a young lady who had joined the vessel at Colombo on 23rd April, *i.e.*, twelve days before arriving at Adelaide, was found to be suffering from small-pox. She was just beginning to feel ill when she left the vessel.

No other case occurred either on the vessel or in South Australia, nor did any case occur amongst the persons quarantined at Melbourne and Sydney.

154. 1893.—*Woolloomooloo*. Arrived at Adelaide on 10th July (9th June is given as the date in another reference), having had two cases of small-pox on board during the voyage from England. The two cases and Adelaide passengers were quarantined at Adelaide. Vessel arrived at Sydney on 8th August and eight passengers and 49 crew were there quarantined. No further cases developed.

155. 1893.—*Victoria*. During May this vessel arrived in Adelaide and proceeded to Melbourne and Sydney without any quarantine measures being imposed at any port. Not long after her departure from Melbourne, the Adelaide authorities discovered that one of the passengers recently landed at Adelaide from the *Victoria* had developed small-pox. The passengers in the other States were traced and kept under supervision, but no further case occurred.

156. 1894.—*Massilia*. During the voyage from London two cases of small-pox (both lascars) had occurred. One was landed at Aden and the other at Adelaide. The vessel arrived at Sydney on 7th March, and there landed 23 passengers and 198 crew. No further cases occurred.

157. 1895.—July, *Lusitania*, from London. An Assyrian family was taken on at Port Said. Shortly afterwards one of them, a child 5 years of age, was found to be affected with small-pox. The whole family were removed at Colombo, but two more cases occurred after leaving that port, one of them being removed at Albany, the other at Adelaide. The vessel reached Adelaide on 13th July, and Sydney on 20th July. 76 passengers and 108 crew were landed at Sydney. No further cases occurred.

158. 1895.—October, *Cuzco*, from London. A case of small-pox on board was diagnosed, both at Albany and Adelaide, as chicken-pox. The real condition was diagnosed at Melbourne. The patient was an engineer, and his rash developed on 29th September. The patient was carried on to Sydney. Sydney was reached on 22nd October, and 123

passengers with 108 crew were there landed. Two cases were on board on arrival at Sydney, and one case developed at the Quarantine Station there. No further cases occurred.

159. 1895.—December, *Australien* arrived in Sydney from France on 9th December with 122 passengers and 185 crew. One case of small-pox (the ship's butcher) had been landed at Melbourne. No further cases occurred.

160. 1895.—The s.s. *Oroya* arrived at Albany during October, 1895, with a disease on board which was diagnosed, both at Albany and Adelaide, as being chicken-pox. At Melbourne the disease was decided to be small-pox, although the vessel was not quarantined either at Melbourne or Sydney. There is no record of any further case.—(Borthwick Quarantine, *Australasian Medical Gazette*, 1897, p. 257).

161. 1896.—*Ninereh* left London, 24th December, 1896; left Teneriffe, 31st December; reached Cape Town, 15th January; and Melbourne, 5th February, where she was granted pratique, and later (7th February) was quarantined.

The fourth officer is stated by the captain to have been out of sorts and off duty two or three days after leaving London, and on resuming duty, to have presented "a lot of spots on forehead and face, the spots exactly resembling those which he (the captain) later developed, and prior to his illness to have always taken a short cut to his cabin from the deck through the pantry, where likely enough he infected the next to fall ill, viz., Jarvis."

The subsequent cases occurred in the following order:—

2. H. J., pantryman. Onset 13th January, rash 16th January. This was the case which led to the quarantining of the vessel. Vaccinated in infancy. Recovered.
3. Captain A. Onset 2nd February, rash 5th February. Vaccinated in infancy. Recovered.
4. C. D., Third Officer. Onset 2nd February, rash 7th February. Vaccinated in infancy. Very mild attack.
5. C. C., Second Steward. Onset 3rd February, rash 6th February. Vaccinated in infancy. Very mild attack.
6. Mrs. W., aged 55 years, saloon passenger. Onset 3rd February, rash 6th February. Vaccinated in infancy. Very mild attack.—(Dr. Gresswell's Report to Victorian Board Health, 5th May, 1897).

This outbreak is interesting by reason of the fact that it was, with the exception of one passenger, limited in extent to the staff of the ship and to only two divisions of that staff. The engine-room staff, for example, entirely escaped.

162. 1896.—*Australien*, from France. Arrived at Sydney on 26th July with 59 passengers and 195 crew. An Arab fireman had been landed at Adelaide affected with small-pox. No further case occurred.

163. 1897.—*Himalayah*, from London. Arrived at Sydney on 24th April, and landed 61 passengers and 268 crew. A steward affected with small-pox had been landed at Adelaide. No further case occurred.

164. 1898.—*Caledonien*, from France. Arrived at Melbourne on 5th February and Sydney, 8th February. At the latter port 75 passengers and 180 crew were landed. A lascar seaman had developed small-pox during the voyage and with eight other lascars was isolated at the Adelaide Quarantine Station on 2nd February. Another lascar developed small-pox before the vessel arrived at Melbourne and was landed (with ten passengers) at the Quarantine Station there. No further cases occurred.

165. 1898.—*Australia*, from London. Arrived at Melbourne on 21st March and at Sydney, 25th March. At Melbourne 59 passengers, and at Sydney 66 passengers and 285 crew were quarantined. A lascar was suffering from small-pox when the vessel arrived at Adelaide and was there removed to the Quarantine Station. No further cases occurred.

166. 1898.—*Orizaba*. This vessel arrived at Melbourne on 27th April, when it was found that a third-class passenger—a boy of 14—was suffering from small-pox. There were on board on arrival at Melbourne 147 passengers and 175 crew. On 5th May, the boy's mother developed the disease. There were no other cases. The vessel arrived at Sydney on 1st May.

167. 1899.—*Afric*. This vessel was from Liverpool, *via* Cape Town. She arrived in Melbourne in October and at Sydney on 27th October. Prior to arrival at Melbourne there had been fourteen cases of small-pox among the passengers. All of these fourteen had been landed at Adelaide. 97 passengers were quarantined at Melbourne, and at Sydney 98 passengers and 127 crew. No other cases developed after arrival in Australian waters.

168. 1899.—*Ninereh*. This vessel was from Liverpool, *via* Cape Town. She arrived at Melbourne on 24th November, and at Sydney on 30th November. A passenger who had joined the vessel at Cape Town was found on arrival at Melbourne to be suffering

from small-pox. At Melbourne 92 passengers, and at Sydney 95 passengers and 78 crew were quarantined. Among those quarantined at Melbourne a third-class passenger (P. C.) developed the disease, and died on 15th December. After arrival at Sydney another case developed among those quarantined. The person who died at the Melbourne Quarantine Station was unvaccinated.

169. 1900.—*India*, from London, *via* Suez. A passenger developed small-pox during the voyage and was landed at Albany. At Melbourne 99 passengers were quarantined. There is no record of further cases. This vessel arrived at Melbourne during March.

170. 1901.—*Darius*, from Calcutta. Upon arrival a seaman had suffered from a disease which was at Albany diagnosed as modified small-pox, and at Adelaide as chicken-pox. At Melbourne seven passengers, and at Sydney, which was reached on 17th May, one passenger and 75 crew were quarantined. There is no record of further cases.

171. 1902.—*Eastern*. Arrived in Sydney on 11th January from Melbourne, having completed at that port a journey from Japan *via* Hong Kong, Queensland ports, and Sydney. On the southward journey no case of small-pox was discovered at Sydney, but at Melbourne the third officer was found to be suffering from the disease, and 27 passengers were quarantined. There were no other cases. At Sydney, on the return to that port, there were quarantined sixteen passengers and 77 crew.

172. 1902.—*Indradevi*. Arrived at Sydney on 15th April from New York, *via* Melbourne. Three seamen had suffered from small-pox prior to arrival at Melbourne, and had been landed there. No further cases occurred after the arrival of the vessel in Australian waters.

173. 1902.—*Ville de la Ciotat*, from Marseilles, arrived at Sydney on 6th December. A native seaman had suffered from small-pox prior to arrival at Colombo and had been landed there. At Melbourne 31 passengers, and at Sydney 64 passengers and 201 crew were quarantined. No further case occurred at Melbourne, but at Sydney two Arab stokers developed small-pox and one of these died.

174. 1903.—*Tsinan*. Arrived at Sydney on 13th March from Hong Kong, *via* Queensland ports, and afterwards continued her voyage to Melbourne. The second engineer had suffered from small-pox during the voyage and had been landed at Townsville. Subsequently two cases of modified small-pox developed at the Quarantine Station at Sydney, where 35 passengers and 65 crew had been landed. No cases developed at Melbourne, and there were no further cases at Sydney.

175. 1904.—*Victoria*. Arrived at Melbourne in February. One fatal case had occurred on board prior to arrival at Melbourne, but the records do not say at what stage of the voyage. There were 76 passengers quarantined at Melbourne, but there are no records of the steps that were taken at Sydney. There were no further cases.

CHAPTER XI.

OUTBREAKS ON VESSELS SHOWING FEATURES OF PARTICULAR INTEREST.

The following four outbreaks presented features of such importance that they have been recorded at length, and it has been thought well to deal with them somewhat extensively.

SMALL-POX ON THE G.M.S. *Preussen*, DECEMBER, 1886.

176. The German mail steamer *Preussen* left Bremerhaven on 3rd November, 1886, with a crew of 120 men and three stewardesses. The vessel arrived at Antwerp on 6th November, and there embarked 544 steerage passengers, mostly English emigrants. Port Said was reached on 18th November, and there a delay of four days occurred. During those four days passengers were allowed to go freely ashore, although it was known that small-pox was then very prevalent at Port Said.

On 5th December (*i.e.*, thirteen days after leaving Port Said), a passenger (J. P.) was reported to be sick, and on the 8th the eruption of small-pox appeared. In discussing the measures then taken on board the President of the New South Wales Board of Health says in his report, "they were not so stringent as the circumstances required." The measures taken are reported to have been as follow:—"Immediately on the appearance of the fever the patient was isolated in a second class cabin, with two of the crew to attend on him, so that he might be removed from contact with steerage passengers. On the 9th November, about 130 passengers are said to have been vaccinated by the surgeon."

The vessel arrived at Albany on 15th December, and at that port the authorities refused to remove the patient.

Upon arrival at Adelaide on 20th November, the man died, and the body was buried at sea.

Upon arrival at Melbourne, 235 passengers were landed in quarantine, and amongst these, 29 cases of small-pox subsequently made their appearance—one of which died.

The vessel arrived at Sydney on 26th December, "having, apparently, no infectious disease on board." The ship's company was, however, quarantined, and subsequently 79 cases of small-pox made their appearance amongst these persons. The cases appeared amongst both the passengers and crew. The first of the cases to appear amongst these quarantined persons in Sydney occurred on 27th December, and cases continued to occur almost daily until 7th January. On that date the last case occurred. This was the eighteenth day from the removal at Adelaide of the corpse of the first case (J. P.). Of the 79 cases which occurred at Sydney, thirteen died.

On the same date as the appearance of the first case at Sydney (*i.e.*, 27th December), the first case appeared amongst the passengers quarantined at Adelaide. There is no other record of the subsequent events at Adelaide, except that five cases in all developed there.—(*Australasian Medical Gazette*, February, 1887, p. 111).

The following is the order in which the principal events occurred:—

Left Port Said, 22nd November.

First case, J.P., sickened, 5th December.

First case died and body removed, 20th December.

Second case sickened, 27th December.

Last case sickened, 7th January.

It is obvious that as the last case did not sicken before the twelfth day after the second case had fallen sick and that no person sickened later than that day, the last case is the only one which can be considered as belonging to a second "crop." All of the others must have been infected either directly from J.P., or have themselves been infected at Port Said. From 22nd November to 27th December is 35 days, a time far beyond any that has ever been reasonably suggested as the incubation period of small-pox. The conclusion is unavoidable; J.P. was infected at Port Said, and all the others were infected directly from J.P. (with the possible single exception of the last case).

It becomes of interest to ascertain what comments the official report makes upon the effectiveness of isolation. In addition to what has been said above, it is described that "the arrangements for isolation were such that third-class passengers had to pass and repass the hospital door—the forward part of the hurricane deck allotted to the steerage was entered by a companion-way nearly opposite the hospital door." In addition to this the quarters occupied by the steerage passengers are described as having been highly insanitary.

It can hardly be denied that the possibility of the spread of infection existed to a notable extent. The extent of the epidemic is sufficient evidence of this fact.

The extent to which the epidemic attacked the various classes on the ship can only be quoted for the New South Wales passengers. Of the 79 who were there attacked, 4 were second-class passengers, 14 were members of the crew, and 61 were steerage passengers.

The infection was confined chiefly to the steerage passengers, amongst whom the original case occurred, but overflowed these limits to a slight extent. One of the crew was infected by having handled the clothes and bedding of the original case for the purpose of destroying it.

The protection afforded by vaccination is well evidenced by the following figures :—

Of the passengers detained at the New South Wales Quarantine Station—

- (a) Nineteen had never been vaccinated ; of these, 15 contracted small-pox, 9 died, and one lost her eye-sight.
- (b) Fifty-five had been vaccinated and re-vaccinated, 4 were attacked, none of whom died.
- (c) Thirteen had had small-pox before, 3 were attacked, none of them died.
- (d) One hundred and fifty had good or fairly good vaccination marks ; of these, 29 were attacked with no deaths.
- (e) Fifty-nine had deficient vaccination marks ; 16 were attacked, 3 of whom died.

These figures are shown in the table hereunder (Table J). They are of extreme interest, inasmuch as they afford the best example, amongst all those quoted in this history, of a healthy population in which the effect of vaccination can be studied free from disturbing and complicating factors such as must be considered in the other instances. In most instances the recorded data refer only to the persons actually attacked, but, in the present instance, thanks to the patience and precision which characterizes all Dr. Ashburton Thompson's reports, a record has been kept of the vaccinated condition of all patients exposed to infection, and it is therefore possible to study the effect of vaccination not only in modifying the severity of the disease or preventing a fatal result, but also in protecting healthy individuals from contracting the disease.

Not only is this so, but the fact that the community was isolated from the rest of the human population, was confined within narrow limits, and was composed of a number of individuals, each of whom was (on the evidence available) equally exposed to infection, gives to the deductions, *qua* vaccination, an especial value.

From the table given, it is a legitimate deduction that the degree of risk of attack is dependent upon, and largely proportionate to, the degree of vaccination, and that this relation is even more pronounced in respect of the risk of death.

TABLE J.

	Popula- tion at risk.	Number who developed Small-pox.	Number of Deaths.	Attack rate on the total Population at risk.	Death rate on the total Population at risk.	Case- mortality rate.
Never vaccinated ..	19	15	9	78·9	47·37	60
Showing deficient vaccination marks	59	16	34	27·1	5·1	18·7
Suffered from pre- vious attack of small-pox ..	13	3	Nil	23·1	Nil	Nil
Vaccinated with good or fairly good vac- cination marks	150	29	Nil	19·3	Nil	Nil
Said to have been vaccinated and re- vaccinated ..	55	4	Nil	7·3	Nil	Nil

The following are the dates upon which the cases which occurred in Sydney were diagnosed:—

December	27	..	..	..	..	3
	28	..	..	..	..	7
	29	..	..	..	..	13
	30	..	..	..	..	8
	31	..	..	..	..	17
January	1	..	..	..	..	8
	2	..	..	..	..	9
	3	..	..	..	..	8
	5	..	..	..	..	4
	6	..	..	..	..	1
	7	..	..	..	..	1

The greatest amount of infectivity was, apparently, between Albany and Adelaide.

The outbreak is known to have resulted in 112 cases, amongst which were fourteen deaths.

The total number of persons on board on arriving in Australia was 694.

At Adelaide were landed 29 persons, among whom developed 4 cases.

„ Melbourne „ 230 „ „ „ „ 29 „

„ Sydney „ 435 „ „ „ „ 79 „

There is one incident in connexion with this outbreak which should be mentioned, although the available facts are not sufficient to warrant any definite conclusion. In the report upon the outbreak by the President of the Victorian Board of Health, the following remark occurs:—

On the morning of 4th December a man died, as reported, from dysentery, but the body was disposed of very early, before the passengers generally knew of the death. Many passengers believed it was a case of small-pox. On that same day John Pryce first became ill and was moved into the “hospital” cabin, but no other precautions were taken to isolate him.

In connexion with this death from dysentery, the present Superintendent of Quarantine in Sydney, Mr. P. E. Getting, who was a passenger on the vessel, and followed the development of the outbreak with interest, writes as follows :—

I was on very friendly terms with the ship's surgeon, and I am certain that although the coal-heaver is reported to have died of dysentery, he actually died of small-pox, and that he and not Pryce was actually the original cause on board from whom all the others were infected. The two stewards who attended on Pryce had free intercourse with passengers and so had the fourth officer (who superintended the burial of the body from

ERRATUM.

On page 94, Table J, the figure 34 in the column headed "Number of Deaths" should read 3.

The *Oroya* left London on 6th May; Plymouth, 7th May; Naples, 16th May; Port Said, 19th May; Suez, 20th May; Colombo, 30th May. She reached Albany on 10th June; Adelaide, 13th; Melbourne, 15th; and Sydney, on the 18th.

The first case that occurred was that of M. R., whose illness commenced in the Red Sea, about fourteen days out from London. The source of her infection is not specified. The attack pursued a typical course with abundant formation of pustules. The patient herself stated that "for several days from the commencement of her illness she was too weak to walk, and rested on the settee in the saloon or in an easy chair on deck." At Colombo she was, however, apparently well enough to enter into conversation with the native hawkers, who inquired what was the matter with her face. This case was only discovered as a result of inquiries made from G. O. at the time when the latter's attack was being investigated.

The next case was that of G. O., whose rash was first observed on 14th June. Subsequently there were discovered in Victoria two other cases—Rev. Mr. M. and Mr. P.

Although G. O. had been living, from the time of his arrival in Melbourne with the vessel on 15th June, at a large Coffee Palace, no person in that institution contracted the disease. He had, however, "been practically confined to his bedroom and to the reading-room, except for a short time on two occasions, when he went out to a chemist's for medicine."

M. R. was staying at Brunswick, near Melbourne; the Rev. Mr. M. at Carlton, also a suburb of Melbourne; and Mr. P., at Lang Lang, 47 miles from Melbourne. None of these patients spread the infection, and with these four passengers, the disease in Victoria was arrested.

The passengers who had disembarked in Western Australia and in South Australia were collected and quarantined, but no case of the disease occurred amongst them.

The vessel continued her voyage to Sydney, and as the existence of the disease was not suspected at the time of her arrival, there the passengers were all landed. Many of the passengers for Queensland transhipped to the s.s. *Buninyong* and proceeded in that vessel to Brisbane.

The notification of the existence of the disease in Melbourne caused an inquiry by the authorities in Sydney, with the result that four more members of the ship's company were discovered to be affected with the disease.

These were: Miss H., whose rash first appeared on 16th June; the chief steward in the second class; the deck quartermaster in the second class; and M. T., a second class passenger, aged 5 years.

Later, there were notified from Queensland two cases: T. I., who had been a second class passenger on the *Oroya*; and one resident of Queensland.

In connexion with this death from dysentery, the present Superintendent of Quarantine in Sydney, Mr. P. E. Getting, who was a passenger on the vessel, and followed the development of the outbreak with interest, writes as follows :—

I was on very friendly terms with the ship's surgeon, and I am certain that although the coal-heaver is reported to have died of dysentery, he actually died of small-pox, and that he and not Pryce was actually the original case on board from whom all the others were infected. The two stewards who attended on Pryce had free intercourse with passengers and so had the fourth officer (who superintended the burial of the body from one of the ship's boats at sea). This officer was on intimate terms with two girls, who both died of confluent small-pox.

The only importance attaching to this hypothesis that the coal-heaver was the original case, is that, if it be true, then the commencement of the epidemic must be dated back before the arrival of the vessel at Port Said, as, in order that the coal-heaver should have infected Pryce, he must himself have been infected 24 days at least before 4th December, *i.e.*, about 10th November. In view of the uncertainty connected with this case, the recorded statements are repeated, and the matter must be left there.

SMALL-POX ON THE R.M.S. *Oroya*, 1892.

177. In June, 1892, four persons were discovered in Victoria suffering from small-pox. Each of these cases had landed but a few days previously from the R.M.S.S. *Oroya*. The circumstances surrounding the occurrence of small-pox on this ship were as follow :—

The *Oroya* left London on 6th May; Plymouth, 7th May; Naples, 16th May; Port Said, 19th May; Suez, 20th May; Colombo, 30th May. She reached Albany on 10th June; Adelaide, 13th; Melbourne, 15th; and Sydney, on the 18th.

The first case that occurred was that of M. R., whose illness commenced in the Red Sea, about fourteen days out from London. The source of her infection is not specified. The attack pursued a typical course with abundant formation of pustules. The patient herself stated that "for several days from the commencement of her illness she was too weak to walk, and rested on the settee in the saloon or in an easy chair on deck." At Colombo she was, however, apparently well enough to enter into conversation with the native hawkers, who inquired what was the matter with her face. This case was only discovered as a result of inquiries made from G. O. at the time when the latter's attack was being investigated.

The next case was that of G. O., whose rash was first observed on 14th June. Subsequently there were discovered in Victoria two other cases—Rev. Mr. M. and Mr. P.

Although G. O. had been living, from the time of his arrival in Melbourne with the vessel on 15th June, at a large Coffee Palace, no person in that institution contracted the disease. He had, however, "been practically confined to his bedroom and to the reading-room, except for a short time on two occasions, when he went out to a chemist's for medicine."

M. R. was staying at Brunswick, near Melbourne; the Rev. Mr. M. at Carlton, also a suburb of Melbourne; and Mr. P., at Lang Lang, 47 miles from Melbourne. None of these patients spread the infection, and with these four passengers, the disease in Victoria was arrested.

The passengers who had disembarked in Western Australia and in South Australia were collected and quarantined, but no case of the disease occurred amongst them.

The vessel continued her voyage to Sydney, and as the existence of the disease was not suspected at the time of her arrival, there the passengers were all landed. Many of the passengers for Queensland transhipped to the s.s. *Buninyong* and proceeded in that vessel to Brisbane.

The notification of the existence of the disease in Melbourne caused an inquiry by the authorities in Sydney, with the result that four more members of the ship's company were discovered to be affected with the disease.

These were: Miss H., whose rash first appeared on 16th June; the chief steward in the second class; the deck quartermaster in the second class; and M. T., a second class passenger, aged 5 years.

Later, there were notified from Queensland two cases: T. I., who had been a second class passenger on the *Oroya*; and one resident of Queensland.

The total number of cases therefore were—

Nine amongst the passengers, all belonging to the second class. Four amongst the resident population of Australia—three in New South Wales and one in Queensland. Of these four, the three New South Wales cases were definitely infected from the ship while the Queensland case was an official of the Quarantine Department, who contracted the disease from T. I. Therefore, as Dr. Gresswell states, “there can be no doubt that those cases which are recorded above constitute in themselves one outbreak, separate and complete in itself.”

Considerable interest attaches to this outbreak from several aspects. The first point to which attention is attracted is that although there were a large number of passengers and crew on board the vessel (there were 262 passengers on the vessel's arrival at Adelaide), there were only nine people affected. It is obviously very important that all of these nine people were either passengers in, or members of the staff of, the second class, and that the epidemic was limited to that class. It becomes then a crucial question whether there is any satisfactory explanation of this limitation of the infection to the second class and to only nine of the passengers and crew belonging to that class.

It will be well to consider the cases separately.

G.O. had a conversation with M. R. a day or so before reaching Colombo. This was the first occasion since leaving Gibraltar that he had spoken to her.

Miss H. spent much of her time with Martha (M. R.), and helped her to move about when her feet were sore with the pustular rash.

Rev. Mr. M. states that he kept at a distance from M. R. while between the Red Sea and Colombo, regarding her as suffering from a loathsome disease, and that afterwards, soon after leaving Colombo, when her face had greatly cleared, he repeatedly helped her along the deck, though he noticed, with much uneasiness, the rash on her wrists.

Mr. P., who had had no conversation with M. R. during the voyage until several days had elapsed after leaving Colombo, borrowed a book from her, and sat with her on three or four consecutive evenings prior to reaching Adelaide—they reached Adelaide on the 13th June—asked her the meaning of some words in the book (he had an imperfect knowledge of English); and he fell ill of small-pox on 23rd June.

J. B., the deck quartermaster, frequently spoke to M. R. when she was ill on deck, and helped her with her chair and wraps.

H. T., chief steward in the second class, doubtless had many opportunities of contracting infection.

M. T., aged 5. In connexion with this case it is interesting that M. R. states that between the Red Sea and Colombo she was so ill that she took what food she could eat, not with the adults but with the children. It may be presumed that most of these children had been vaccinated not many years previously. In any case, of all the children exposed to infection from M. R., only one child caught the disease, and that child was unvaccinated.

These seven cases make the first crop directly infected from M. R.

T. I., the last case, fell ill on 25th June. *i.e.*, just the twelfth day after G.O., whose rash first appeared 14th June, and it is stated that these two were "always in each other's cabins." This man may, therefore, have been infected from G.O. and so have been the first of the second crop. On the other hand, it must be remembered that M. R. did not leave the vessel till 15th June, and T. I. might have been infected direct from her and so belong to the first crop.

Excluding this last case then, it is seen that the epidemic on the vessel itself was limited to the first crop, *i.e.*, to those people infected directly from the original case. Had the voyage been longer in duration, involving the necessity of treating these persons on board, there would have quite probably been a second crop. It was, therefore, fortunate that the arrival of the vessel at her terminal port coincided with the appearance of these cases, and so effective isolation could be ensured.

On the one hand there is the fact that there was a certain amount of voluntary and involuntary isolation of the patient. Dr. Gresswell's report reads as follows :—

Concerning the cause of the immunity in those persons who were not attacked we have not much information. The condition of vaccination in their cases is not known, but so far as the other members of the "R." family are concerned, I am able to state that the mother had been revaccinated, and that all of the children with whom Martha were berthed (*i.e.*, in the same cabin), were younger than Martha (who was 16½ years old), and all had been well vaccinated. Concerning the contention that no one contracted small-pox from Martha between the Red Sea and Colombo it may be noted that there is the statement of the girl herself that she took what little food she could, not with the adults, but with the children of the second saloon, most of whom it may be presumed had been vaccinated not many years previously; that between the Red Sea and Colombo she passed but very little time at meals, having then no appetite for more than a little soup, and that at other times between those places she hid away from the other passengers as much as possible; and there are the statements of a considerable number of second saloon passengers that between those places they kept as far as possible away from her.

On the other hand, there is a clear history of very definite close personal contact between M. R. and those persons subsequently attacked. It might be expressed that it was because M. R. isolated herself and was shunned by her fellow passengers that so few cases occurred, while on the other hand those who did contract the disease had been in close contact with her. So that it would seem to be true of this outbreak that the closer the degree of personal contact the greater the liability of infection, and it would even seem to have been true that without actual personal contact no transmission of infection did occur.

But again, it must be considered the two groups of people who had the most intimate contact were her own family and the children with whom she had meals, and not one of the family, and only one of the children, contracted the disease. It has, however, been pointed out that all the family and presumably most of the children were well-protected by vaccination and that the only one of the children who was attacked was unvaccinated.

Therefore, it appears justifiable to say that the probability of any person becoming infected was dependent on the one hand on the degree of personal contact he had with M. R., and on the other, on the extent of his protection by vaccination.

Now how does this statement as to the protection by vaccination apply in the case of those who were attacked? From the table it will be seen that

two had never been vaccinated, and that the others had been vaccinated in infancy, but not successfully since that time, and all were over 16 years old.

It is therefore apparent that while vaccination in infancy is a good protection to a certain extent, revaccination is necessary to complete protection.

Finally, it will be of interest to ascertain how this case of M. R., whose rash was apparent from Colombo to Melbourne, escaped detection at Albany, Adelaide, and Melbourne, by the quarantine authorities, and how Miss H., whose rash was apparent on arrival of the vessel at Sydney, escaped detection at that port.

Dr. Ashburton Thompson, in his report, states that the surgeon of the *Oroya* had failed to recognise the disease, that the inspection at Albany and Adelaide had been entrusted to laymen, and that at Melbourne, although the Health Officer boarded, no medical inspection of passengers and crew was made. The provisions of the Quarantine Act at Sydney were such that, as the *Oroya* had arrived from an Australian port, she was not liable to inspection. It is hardly surprising then that the cases were not discovered.

Concerning the persons resident in Sydney who were infected by members of the ship's company, there is little information. Dr. Ashburton Thompson in his report passes lightly over this aspect in the following words :—

This introduction of small-pox led to the infection of three persons among the resident population of Sydney. The case of M. T. was concealed for four or five days, and three members of three different families took the infection from her. The three households were removed to the quarantine station on 16th July, and their dwellings shut up and disinfected.

The following table gives the salient details regarding the nine cases which occurred amongst the ship's company:—

Name.	Rating.	Sex.	Age.	State as to Vaccination.	Isolated at—	Date of Attack.	Date of Infection.	Result.
1. G. O.	Second class passenger	M.	28	Infancy, poor	Melbourne	11th-13th June	28th-30th May	Recovered
2. M. H.	"	F.	48	Infancy, good	Sydney	12th-13th June	29th-30th May	"
3. W. T.	Steward	M.	22	Alleged; no scars..	"	17th June	3rd June	"
4. J. B.	Quartermaster	M.	38	Infancy, good	"	18th June	4th June	Died
5. G. McC.	Second class passenger	M.	40	Infancy, poor	Melbourne	20th June	6th June	Recovered
6. H. P.	"	M.	54	Infancy, poor	"	23rd June	9th June	"
7. M. T.	"	F.	5	Unvaccinated	Sydney	24th June	10th June	"
8. I. ..	"	M.	32	Unvaccinated	Brisbane	25th June	11th June	Died
9. M. R.	"	F.	16½	Infancy, good	Melbourne	A day or two prior to 24th May	..	Recovered

SMALL-POX ON THE S.S. *Cloncurry*, JANUARY, 1895.

178. The *Cloncurry* was quarantined upon arrival at Port Phillip Heads on 28th January. She left Calcutta with a general cargo on 23rd December, touched at Singapore, and left there on 4th January, reaching Fremantle 17th January. She had twelve European officers, 60 lascars as crew, 26 saloon passengers, and twelve steerage passengers. One of the lascars was discovered with an eruption on 5th January, which at Fremantle was found to be the eruption of small-pox, and he, with two others who had in the meantime fallen ill, was landed and isolated at Fremantle. The whole of the ship's company was vaccinated at Fremantle. On 25th January, a male saloon passenger presented a rash, which, on arrival at the Heads, was found to be that of a semi-confluent case of small-pox, and another lascar also was found to be suffering from the same disease.—(*Minutes, Victorian Board of Health*, 30th January, 1895). No subsequent cases on the vessel.—(*Minutes*, 13th February, 1895).

One of the men from the ship, named Voy, who had not had the disease himself, left the Quarantine Station on 13th February, and went to board with a Mrs. King, at 48 Walsh-street, West Melbourne. Mrs. King turned out the personal effects of Voy and sent them to a large steam laundry on 14th February. On 26th February, she became ill and was admitted on 2nd March to the Melbourne Hospital, where subsequently small-pox was diagnosed.—(*Minutes*, 13th March, 1895).

No further cases occurred amongst the staffs of either the hospital or the laundry.—(*Minutes*, 27th March, 1895).

This case is highly interesting as being the most definite instance in the history of small-pox in Australia of the transmission of the disease to a distance by inanimate objects (fomites).

It was said at the time that Voy had had a good deal to do with the passenger who had fallen sick just before the *Cloncurry* arrived at Melbourne, and had carried him some little distance, wearing at the time the clothes that were handled by Mrs. King.

THE OUTBREAK ON THE *Ormuz*, MAY, 1901.

179. The R.M.S. *Ormuz* arrived at Adelaide on 21st May, 1901, and was examined by the Port Health Officer. A case of small-pox was discovered in the person of a sailor who was convalescent at the time of discovery. He had been taken ill a fortnight previously and isolated at first for a few days, but at the time of arrival at Adelaide he was engaged in handling mail bags for transhipment.

The passengers for Adelaide—56 in number—and 64 visitors to the ship, who had gone on board before the vessel was ordered into quarantine, were sent to the Quarantine Station.

On 1st June, a passenger (A. B.) who had joined the *Ormuz* in Western Australia, showed symptoms of small-pox. This was the twelfth day after arrival at Adelaide, and hence it is probable that the infection occurred on the day of landing. This patient died on 12th June at the Quarantine Station at Adelaide.

On 16th June, a niece of the patient, A. B., was diagnosed to be suffering from small-pox.

On 21st June, one nurse, and on 24th June the second nurse, were found to be suffering from small-pox. Neither of these nurses had been revaccinated on entering on their professional duties, both had nursed A. B.

One other case occurred on the station amongst the passengers, but apart from the fact that he became ill on 7th June, there are no details of this case.

While there is no evidence to show how A. B. contracted his infection, although presumably this was from the sailor who was the first case, yet it is very interesting that three of the other four cases were in close and daily contact with A. B.

The vessel continued her journey to Melbourne after the removal of the Adelaide passengers and arrived at that port on 23rd May, and subsequently continued her voyage to Sydney. The various sources of information do not agree upon the events that occurred after the vessel left Adelaide.

The Report of the Board of Health of Victoria states that 74 passengers were quarantined at Melbourne, but makes no mention of any cases developing there.

Borthwick states:—"On the 2nd June, six cases of small-pox at Melbourne, and nine at Sydney were reported among the *Ormuz* passengers, and up to the 7th June the following additional cases were reported:—Ten at Sydney, one at Fremantle, and two at Adelaide." (*Quarantine*, p. 14).

The records of the Quarantine Station at Sydney state that 23 cases were treated there, one of them (a girl, aged 4) being fatal.

Dr. Armstrong in his Annual Report for 1901 as a Medical Officer of Health for the Metropolitan District of Sydney, states that 22 cases occurred amongst those on board after the arrival of the *Ormuz* at Sydney.

Probably the last statement is nearest the truth, but in any case no other details are forthcoming. The case at Fremantle has been dealt with elsewhere (*see* p. 70).

The report submitted by the President (Dr. Gresswell) to the Victorian Board of Health, states that six cases occurred at Melbourne, that one of these six was a passenger who joined the boat at Fremantle, and that the Melbourne, Adelaide, and Sydney patients. *i.e.*, the first batch—all developed on or about the same day.—(*Board Minutes*).

Dr. Elkington, who had charge of the patients in quarantine in Melbourne, states that six cases developed amongst the passengers quarantined at Melbourne, one of whom died, and that the disease was of a very virulent type.

CHAPTER XII.

OCCASIONS ON WHICH SMALL-POX HAS BEEN INTRODUCED FROM OVERSEA BY KNOWN OR SUSPECTED VESSELS.

The vessels which have been dealt with in Chapters X. and XI., are instances in which the vessel was infected with small-pox at some stage of the voyage—in many cases the infection was still present, and manifested marked activity after arrival in Australian waters—but the measures adopted were successful in their attempt to confine the infection to the ship's company.

It could not, however, be expected that there could be conceived and instituted any system of defence so complete that it would never permit of small-pox infection breaking the quarantine cordon, so to speak, and being discovered on land after all measures of quarantine restriction had ceased.

Such cases have from time to time occurred, and naturally the circumstances under which the defence measures in force at the time have been tried and found wanting, are of very great interest. It is probable that such cases have occurred more often than is recorded, but all the facts which have been collected from various sources are given hereunder.

It should be stated here that the following list does not include vessels known to have produced *epidemics* on land. Those will be discussed later, but may be mentioned here. They are as follows:—

French or English Fleet (very doubtful), Sydney, 1789 (*see* p. 2).

Commodore Perry, Melbourne, 1857 (*see* p. 27).

Tornado (doubtful), Geelong, 1866 (*see* p. 30).

Avonvale, Melbourne, 1868 (*see* p. 30).

Nebraska, Bendigo, 1872 (*see* p. 41).

Brisbane, Sydney, 1877 (*see* p. 10).

Rome (very doubtful), Melbourne, 1884 (*see* p. 46).

Saladin, Perth, 1893 (*see* p. 66).

Gracchus (doubtful), Launceston, 1903 (*see* p. 60).

180. 1887.—*Port Victor*.^{*} This vessel arrived at Port Darwin on 9th June, 1887. She had left Hong Kong on 24th May, and Sumatra on 1st June.[†] On her arrival at Port Darwin there was nothing to excite suspicion. She proceeded to Sydney, arriving there on 20th June. At Sydney she was inspected and passed as a clean ship. On 1st July a seafaring man who had been a passenger by the vessel presented himself as an inpatient at one of the Sydney hospitals, where he was found to be suffering from small-pox. This man first fell ill on 28th June. There is no record of the subsequent events at Sydney. Presumably no further cases occurred and no quarantine measures were adopted with the vessel.

On 31st July a Chinaman was found in one of the streets at Port Darwin, covered with small-pox, and (according to the account given in the *Transactions of the Intercolonial Medical Congress*, 1887, p. 230), on inquiry it turned out that other cases had been secreted by the Chinese there, and that the first sufferer became ill a few days after landing from the *Port Victor*, in which he arrived from Sumatra. Not long afterwards three people (two Chinese and one European) developed small-pox in Port Darwin (*see* p. 76) and, according to the *Annual Report of the South Australian Central Board of Health*, 1887-8, p. 11, "the Board felt satisfied that the infection came in one of the ships (probably the *Port Victor*), bringing Chinese passengers."

^{*} *Australasian Medical Gazette*, July, 1887, p. 260. *Annual Report of Central Board of Health, South Australia*, 1887-8, p. 11. *Transactions Intercolonial Medical Congress*, 1887, p. 230.

[†] The Board of Health Report states that the vessel left Singapore on 20th June, but this is obviously a mistake, as Dr. Whittell, the President of the Board of Health, wrote the paper quoted from the Congress *Transactions from which the other dates are taken*.

The circumstances surrounding this outbreak are in many ways very unsatisfactory. The man who became ill at Sydney was first attacked on 28th June, *i.e.*, nineteen days after leaving Port Darwin. There is no reasonable probability that there was in this case so unusually long a period of incubation as nineteen days, and it must therefore be assumed that this man was infected between Port Darwin and Sydney.

The Chinese who was discovered at Port Darwin on 31st July left the *Port Victor* on 9th June, and if he was infected on that vessel, as it is presumed was the case, he must have been infected either on or prior to 9th June.

It must therefore be assumed that both the Sydney case and the Port Darwin Chinese were infected from a common source which was probably still on the vessel on arrival at Sydney.

It is difficult to understand the following statement in the Report of the Central Board of Health, South Australia, 1887-8, upon the discovery of the Sydney case:—"The circumstances of the case were communicated to the authorities at Port Darwin, where it was ascertained that although 5 deck passengers, 69 Chinese, and 5 stowaways were landed at that port from the *Port Victor*, no suspicious symptoms could be detected by the Health Officer who instituted a close investigation."

This means that if all of the Chinese who came by the *Port Victor* were really seen by the Health Officer at Port Darwin, then the one who was found on 31st July to have small-pox, did not have that disease about 1st or 2nd July, and inasmuch as he had left the *Port Victor* on 9th June, it becomes rather mystifying. It may have been that this man was secreted by his fellow countrymen at the time of inspection, an event which was more than likely, and another man substituted; or it may have been that there was an intermediate case which remained undiscovered, and from which the 31st July Chinese was infected.

The facts above detailed are all that are now available, and no further speculation is justified.

This vessel and the circumstances of its infection with small-pox assume very considerable importance in view of the official allegations of its responsibility for the outbreak of small-pox in Launceston in 1887 (*q.v.*, p. 55).

The *Australasian Medical Gazette* (1887, p. 32), states that Dr. Ashburton Thompson, in a paper read before the Royal Society of New South Wales, 18th October, 1887, gives reasons for concluding that sixteen Chinamen carried by the *Port Victor*, are the last persons known to have reached Launceston by an infected vessel. Dr. Thompson's remarks on this part of his subject are, however, not quoted in the Society's official report of his paper, although there is some indication that the subject had been elsewhere dealt with.

Mault, however, in his official report of the Launceston outbreak says that "these Chinese were all examined and kept under observation until all danger of development of small-pox was considered to be past."

Tsinan (No. 51, p. 79). This vessel sailed from Hong Kong on 27th July, 1887, and arrived at Port Darwin on 6th August. On the 27th August a man was brought into quarantine at Port Darwin. It was found that he was a passenger by the *Tsinan*, had travelled 30 miles inland to a railway camp, and had commenced working there before the small-pox appeared on him.—(*Transactions, Intercolonial Medical Congress*, 1887, p. 230). No other cases appear to have occurred at Port Darwin, although apparently four cases occurred on the vessel before her arrival at Sydney. (*See* p. 79).

Oroya, 1892 (No. 177, p. 95). The introduction of small-pox by the R.M.S. *Oroya*, in 1892, led to the occurrence of three cases of small-pox among the resident passengers of Sydney. One of the passengers by the *Oroya* (M.T., *see* p. 95) developed small-pox after leaving the vessel, and the fact of the existence of small-pox was concealed for four or five days. During this period three persons, one in each of three different families, were infected by M.T. These patients and their households were isolated, and with these cases the spread of the infection was arrested.

Cloncurry, 1895 (No. 178, p. 100). This vessel was the cause of a case of small-pox amongst the resident population of Melbourne. (*See* p. 53).

181. 1901.—*Euryalus*, 1901.* This vessel arrived at Sydney on 8th March from Calcutta and landed a passenger who, four days after the arrival of the vessel, *i.e.*, 12th March, developed small-pox, and subsequently transmitted the disease to two relatives at his home at Leichhardt, a suburb of Sydney. On 3rd March the vessel had arrived at Melbourne, and on 15th March a patient at the Melbourne Hospital, who had been a passenger by the *Euryalus* from India, was discovered to have small-pox. This Melbourne case did not, so far as is known, infect any others.

No recognised cases of small-pox had occurred on board the *Euryalus* during the voyage from Calcutta, but one of the passengers was alleged to have had an illness which was probably a mild attack of small-pox.

* Report of the Medical Officer for the Metropolitan District of Sydney for 1901, p. 10. *Annual Report Victorian Board of Health*, 1898-1904, p. 13.

1901.—*Ching-tu* (No. 73, p. 80). This troopship from China arrived in Sydney on 27th April. Seven cases occurred amongst her company after her arrival in port. The infection was not limited to those who had been on board the vessel, but two persons amongst the resident population of Sydney were directly infected from the *Ching-tu* patients. One of these, who recovered, lived at Surry Hills, a suburb of Sydney; and the other, who died, lived in North Sydney.

182. 1903.—*Gracchus*.* Arrived in Melbourne from India on 2nd May, 1903. On 20th May a man (— W.) was discovered in North Melbourne suffering from small-pox, and on the following day another person was found to be similarly affected at Little Bendigo, near Ballarat.

The first of these had been a passenger (— W.) by the *Gracchus* and had joined the ship at Singapore. He first fell ill on 12th May, and when reported was living with his wife and child at the house of a friend. No other person was infected by him.

The second case (Mrs. D.) was the wife of another passenger (— D.) from the *Gracchus*. She first fell ill on 16th May.

It was subsequently ascertained that Mr. D., the husband, had had a mild attack of small-pox about five days after leaving Sourabaya. It is evident from the dates given above that W. was infected on the boat (possibly from D.), and that Mrs. D. was infected from D. after coming ashore.

In the house at Little Bendigo where the D.'s had been staying there were in all eleven persons, and it was found on inquiry that Mr. and Mrs. D. had stayed at a hotel in Lonsdale-street, Melbourne, for some days after leaving the *Gracchus*, and before going to Ballarat. No person in either the hotel or the house developed the disease, although Mr. D. was ascertained to have been in an infectious condition on arrival at Melbourne. It is a striking fact that no further cases developed, although there appears to have been some considerable possibility of spread from both W. and D.

The occurrence of these cases from the *Gracchus* is of importance in connexion with the outbreak of small-pox at Launceston in 1903. (See p. 61.)

In addition to the instances mentioned above, in which the infection of small-pox obtained a temporary footing on Australian soil, in spite of quarantine system, there must also be mentioned other instances in which quarantine measures were imposed at one or other port, but for some reason the infection did nevertheless obtain a temporary footing.

These are as follows :—

Yarra (No. 150, p. 89). In this case a rash from which one of the passengers was suffering was diagnosed by the ship's surgeon, by the Health Officer at Albany, by the Health Officer at Adelaide, as chicken-pox, and it was only at Melbourne that the true nature of the disease was recognised. As has been described (*see pp.*) this man infected his cabin-mate, who did not develop the disease until he had gone ashore at Adelaide. He in turn infected the servant at the house at which he stayed at Adelaide.

Karlsruhe (No. 152, p. 89). In this instance a woman on board had suffered from a rash which the ship's surgeon diagnosed as "prickly heat." This diagnosis was apparently accepted at Adelaide, but was negatived on arrival at Sydney, when it was found that the disease was small-pox.

About three weeks afterwards a child was found to be suffering from small-pox at a country town in South Australia. This child had been a passenger by the *Karlsruhe*.

Australia (No. 153, p. 89). In this instance a passenger had joined the vessel at Colombo, twelve days before arriving at Adelaide. She was just beginning to feel ill when she left the vessel at Adelaide, and a few days later the characteristic rash of small-pox was fully developed.

As Australia is free from small-pox, and is the only large country where that disease is not endemic, it is obvious that any scheme which has as its object the keeping of Australia free from small-pox must commence with rigorous measures designed to prevent its introduction by sea. The continent is free from small-pox, that disease can only affect the Australian population if it is introduced from without, and it can only be introduced by sea. It has been seen from the preceding pages that the occasions on which the disease has been brought right up to the ports, but arrested there, have been numerous. It might be thought that all that is required to afford Australia

* Report and Minutes of Victorian Board of Health, 1903.

complete security against small-pox is a rigorous system of defensive measures at the maritime frontier, but it has just been seen that on at least sixteen occasions the systems for the time being in existence failed to justify any confidence that may have been reposed in them as complete barriers against the entrance of small-pox. These systems may have been open to criticism, they were doubtless faulty in some respects; but on the whole they must be regarded as having been practically efficient as systems, at any rate they were clearly efficient enough to remove the menace offered by infected vessels on numerous occasions within the previous years.

It will be, therefore, in the highest degree instructive to study these occasions upon which the quarantine system failed, so that the reasonableness of trusting entirely to a quarantine system may be assessed at its true value.

Probably the best mode of doing this will be to discuss each of the above sixteen occasions in detail.

Port Victor. The consideration of the facts connected with this vessel's arrival leaves a doubt as to exact circumstances connected with the presence of small-pox on the vessel.

If the examination by the Health Officer really covered all the Chinese who arrived by the vessel, then it is clear that the disease had not developed until after the examination, but this is rendered improbable by the fact that the examination was not made until at least 22 days after the vessel had arrived at Port Darwin.

The Sydney case did not develop until eight days after his arrival in Sydney, so was obviously not in any way identifiable as a prospective case of small-pox.

It is almost certain, from the facts available, that there was on board at Port Darwin, and also between Port Darwin and Sydney, some source of infection which was not discovered either at the time of the vessel's arrival at either port or afterwards.

And in any event at least one of the two cases—the one at Sydney—most certainly could not have been detected by the most alert Health Officer. There are here revealed then two possible sources of error—(1) a breakdown of the quarantine system; (2) a contingency impossible to provide against, viz., a passenger landing in the incubation stage of small-pox but who was not, at the time of landing, in the least degree suspicious.

Tsinan, Euryalus, Australia, Commodore Perry, Nebraska, and Avonvale. These six vessels may well be considered together, as they all present the same feature, viz., a passenger landing within the incubation period of small-pox and not presenting any suspicious symptoms.

The danger in such cases is indicated in the case of the *Tsinan*, where the passenger had travelled inland and commenced working at a railway camp before he became ill, while it is well exemplified in the case of the *Euryalus* in which the infected passenger reproduced the disease in two of the resident population of Australia.

An additional factor is, however, illustrated by the cases of the *Avonvale*. The master, although aware of the presence on board his vessel of a case in which there was reasonable suspicion of small-pox, did not report the case to the authorities, and therefore by his negligence was responsible for a widespread epidemic. This is one of the sources of possible failure in any quarantine system. Probably in such a case as the *Avonvale* the action of the master was negligent rather than wilful.

In the case of the *Saladin* (Perth, 1893, p. 66), the facts are not complete enough to furnish a reasonable hypothesis. The most likely is that the Cingalese was infected on board the vessel while she was in port, but the reason for the failure to detect the infecting person does not appear.

Ching-tu. It is not clear, from the records available, whether any of the seven cases occurred before or after the vessel had been inspected by the Health Officer. It is, however, most probable that the cases appeared after the vessel had been granted pratique, and if so, this vessel falls into line with the *Tsinan* and others.

Yarra and *Karlsruhe* were both instances in which a definite skin eruption was wrongly diagnosed, both by the ship's surgeon and by the port health officers. These must then be considered as evidence of two sources of error in the quarantine system—(1) the inclination of the ship's officer towards the diagnosis of lesser importance; (2) a definite breakdown in the system due to failure on the part of officers to either recognise a small-pox rash, or take adequate measures in a suspicious case, when such persons were known to be on board affected with skin eruptions.

The *Cloncurry* case stands by itself as a definite breakdown of the quarantine system. This vessel was known to be infected, and was quarantined, but in some way, not now known, infected garments were allowed to leave the Quarantine Station.

Other sources of danger exist. The following incident illustrates one such source. When the *Whampoa* arrived at Port Darwin in January, 1888, the passengers and sick were isolated on a vessel—the *Lavuka*—temporarily used for quarantine purposes. On 20th February, one of the Chinese who had been placed on this vessel was found in a mangrove swamp suffering from small-pox, having been thrown overboard by his countrymen. He had had no communication with the mainland and was again placed in quarantine.—(*Annual Report Central Board of Health, South Australia*, 1887-8, p. 12.)

Similarly when the *Preussen* passengers were quarantined at Melbourne, in 1886, one of the engine-room staff escaped and was never seen again.

In the case of the *Brisbane* (Sydney, 1877, p. 10), it is noted that the master was fined £100 for giving false information. Presumably, therefore, he deliberately misled the medical officer who boarded the ship, if she were subjected to medical inspection. A system of quarantine to be successful, postulates certain things, amongst which is *bonâ fide* declaration by the master of the ship of the state of health of all on board, both on arrival of the vessel and during the voyage. In so far as the good faith of the masters is unreliable just so far is any system of quarantine imperfect.

The *Gracchus* and the *Oroya* are instances which must be recognised as definite failures on the part of the quarantine system.

In each instance there was on board on arrival a person in a definitely infectious condition, and in neither instance was this person detected at any of the ports visited.

These instances, therefore, furnish two striking lessons—firstly, that the quarantine system has in the past broken down and may presumably, of course, break down again; and secondly, that persons have arrived at Australian ports in the incubation stage and have developed small-pox after their arrival.

The first of these sources of danger may be reduced to a minimum by the perfection of the system, but naturally the minimum will always remain. A little temporary carelessness, an honest error in diagnosis even confirmed by several consultants, these are contingencies which can never be wholly eliminated.

The second danger, on the other hand, can never be entirely provided against. Colombo, Hong Kong, Manila, Java, the Aru Islands, are all within twelve days' steam of Australia, and a passenger infected in any of these places may arrive at Australia quite free from any symptoms, and yet develop

the disease after arrival. The incubation period of small-pox is almost invariably twelve days. That is to say, for twelve days after a person has been infected, he remains in his normal health and feels not at all ill. On the twelfth day he may feel more or less unwell, but no rash appears until about the fourteenth or fifteenth day.

Another striking fact appears from this series of sixteen vessels, *i.e.*, the few persons who were infected.

The *Port Victor* cannot be emphasized, as the facts are a little uncertain, but assuming that the Chinese passenger produced the subsequent cases, there were only three of these latter. Two of the three were Chinamen, and the third a Customs officer whose duties brought him into contact with the Chinese. It is noteworthy too that of the hundreds of Chinese in Port Darwin, only two are known to have been infected. The *Tsinan* passenger apparently infected no other person.

The *Oroya* case infected only three persons amongst the resident population of Sydney, one in each of three families. There is no record of the degree of contact between the *Oroya* case and the three other cases.

The *Euryalus* patient in Sydney only infected two relatives; the patient in Melbourne did not infect any other person.

The *Ching-tu*.—Although there were seven cases, only two secondary cases were infected.

Neither the *Australia* nor the *Karlsruhe* passengers infected any secondary cases.

The original *Yarra* patient infected only his cabin-mate, and this latter in turn infected only the servant in the house, although it is definitely stated that numbers of persons came to visit him before he was detected and isolated.

The account given of the *Gracchus* cases brings out prominently that although D. must have come more or less into contact with scores of people, as he had been staying at a hotel, and later in a house in which there were eleven persons, the only person infected was his wife.

The above facts justify the deduction that in these instances the disease displayed a low degree of infectivity, and moreover they appear to justify to a certain extent the deduction that a *short* range of infectivity was displayed, only those persons being infected who came into close personal contact with the patient.

CHAPTER XIII.

THE EPIDEMIOLOGY OF SMALL-POX ON BOARD VESSELS
BOUND FOR AUSTRALIA.

Chapters X., XI., and XII., represent the history, so far as it is known, of Australia's defence against small-pox for the last 80 years. It is very much to be regretted that the records are so incomplete, but incomplete as they are they have, for the Australian student of the epidemiology of small-pox, infinitely more value than any theoretical considerations.

No present-day scheme designed to resist the attempts of the small-pox to obtain a footing in Australia could be considered complete unless it had been formulated in the light of the facts connected with these vessels and the deductions warranted by them. Their consideration will therefore have an importance which could not be overestimated.

Fundamentally this history reveals the fact that vessels which have at some period of their voyage conveyed the infection of small-pox have reached Australian ports on at least 182 occasions.

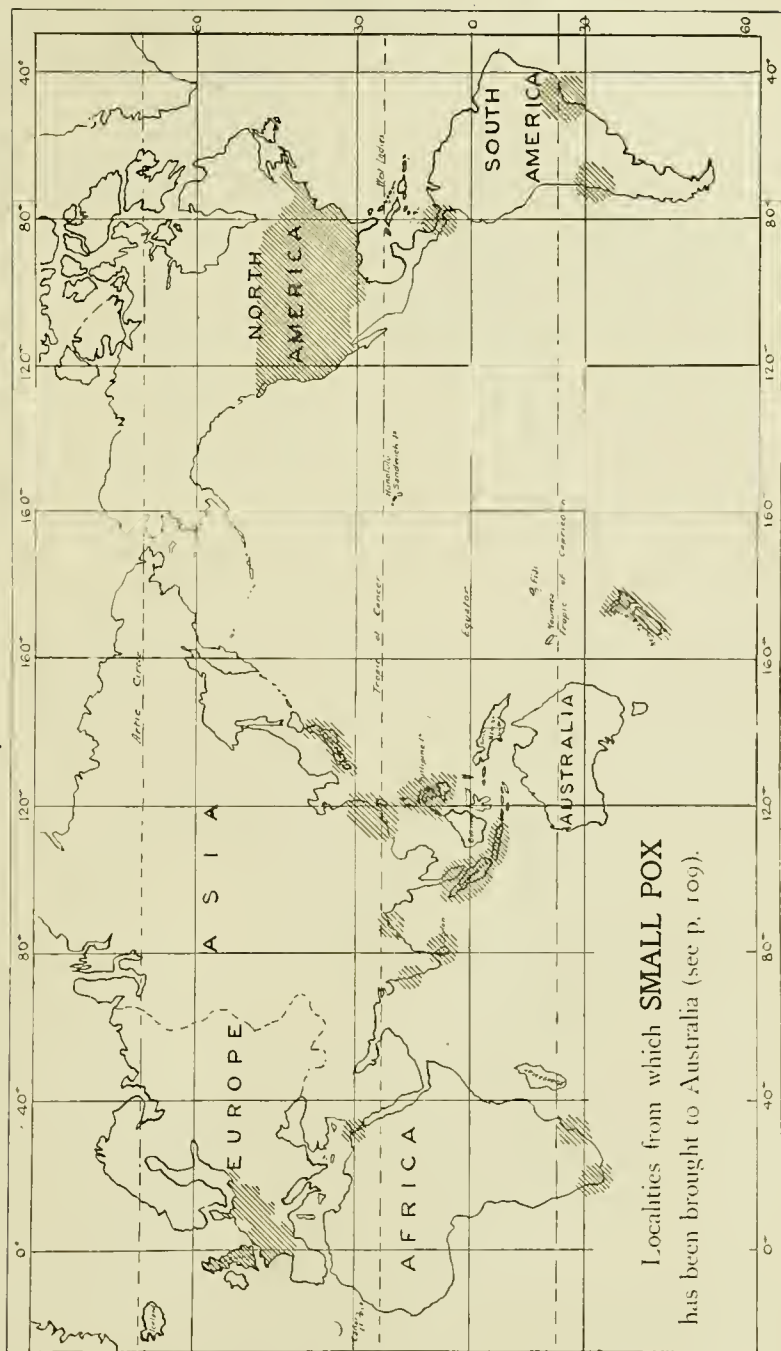
This is a suitable place to draw attention to the fact that the records are very imperfect. In Western Australia, for example, there was no attempt at keeping a serial record of vessels which were quarantined. This laxity was merely in keeping with such other anomalies as the control of the quarantine measures and service being under a Department not in any way connected with the Health Department (a state of affairs which existed until 1906), and as the issue of instructions by the controlling Department that no vessel carrying a medical officer was to be inspected by the Port Health Officer, this latter instruction clearly ignored the lessons of the past, and the consequent neglect must be held responsible for many cases of small-pox. For example—the *Ormuz* in 1901—the removal of the original case would probably have prevented all the subsequent cases. As a matter of fact, the second case was a passenger who joined the vessel at Fremantle.

It must be admitted that a similar laxity was in the earlier years displayed in all the colonies, so that it is not to be wondered at that the records are not complete enough in the cases of the majority of the vessels for extensive deductions to be drawn from them.

Doubtless there have been other instances than those recorded, but it is proposed in the discussion of the subject to confine attention to ascertained facts. These limitations to the value of the above facts having been specified, an attempt will be made to sort out such facts as may legitimately be used, in such a way as to bring out clearly the lessons they provide for the student of the subject.

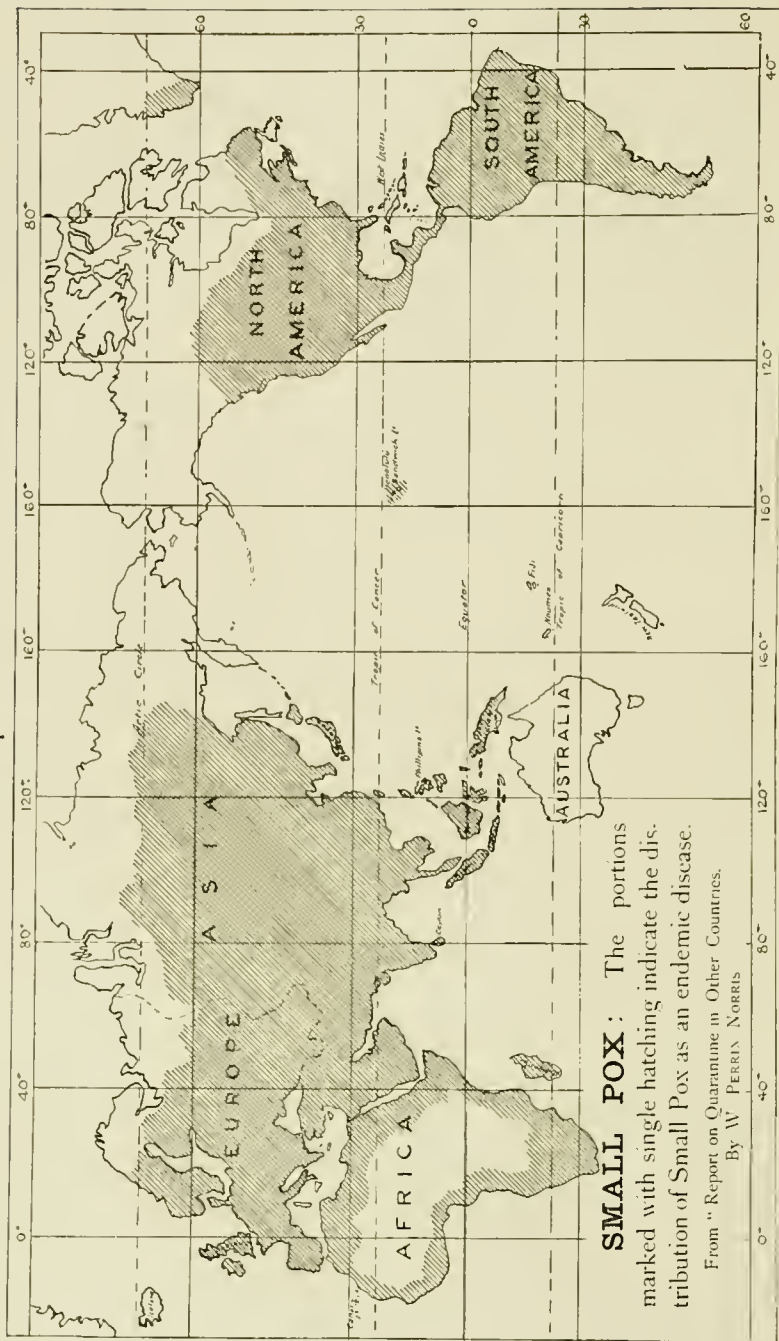
The fact of fundamental importance that first attracts and holds the attention is, that one of the most virulent of the epidemic diseases is known to have threatened to a greater or lesser extent to invade Australia upon 182 occasions within 80 years.

Map of The World.



Localities from which **SMALL POX**
has been brought to Australia (see p. 109).

Map of The World.



SMALL POX: The portions marked with single hatching indicate the distribution of Small Pox as an endemic disease.

From "Report on Quarantine in Other Countries."
By W. PERRIN NORRIS

The countries from which the invading pestilence has been brought are numerous. The list of these countries is as follows :—

England,
Scotland,
France,
Germany,
Java,
New Zealand,
China (Macao, Foo Chow, Hong Kong),
Japan,
Natal,
United States of America,
Chili (Valparaiso),
Brazil (Rio Janeiro),
Cape of Good Hope,
Philippine Islands,
Sumatra,
India (Colombo, Calcutta, Bombay),
Singapore,
Port Said,
Panama.

In order that the ubiquity of the disease may be understood, and the number of points from which the attack may be expected, may be appreciated, the countries from which infection has been carried towards Australia have been marked in black on the chart depicted in illustration. (Plate I.).

It is but reasonable to anticipate not only that infection will continue to be launched towards Australia from these countries, but that every other country in which small-pox is endemic may in the future be added to the list already compiled. Such endemic foci of small-pox are shown, coloured black, in Plate II.

No verbal description can improve upon these two illustrations as demonstrations of the danger. If, however, a single point only on the Australian coast were the place at which the attack was invariably made, it might be legitimate to regard the situation with a mitigated apprehension.

Again it may be said that the inferences are startlingly self evident, and need not be laboured by verbal repetition.

When such a subject as the spread of a disease between two countries by definite isolated agents such as are ships, is under consideration, a great deal of interest is naturally afforded by such facts as indicate any relationship between the number of occasions when ships have been known to be infected, and the years of epidemic prevalence, in the country of origin, of the particular disease under consideration.

In other words, the question that arises is—"Is the spread of infection from the country of origin purely haphazard, occurring whether the disease is epidemic in that country or not, or has it been found to be a more or less general rule that the greater the prevalence of the disease in the country of origin the greater the number of occasions on which the infection is found on outward bound vessels?"

The table given hereunder states the numbers of deaths from small-pox in London in each year, from 1850 onwards, and in a parallel column, the numbers of vessels sailing from England to Australia on which one or more cases developed.

	Number of Vessels arriving in Australia infected with small-pox.		Numbers of Deaths from Small-pox in England and Wales.	Years of Epidemic prevalence in Australia.
	From England.	From All Countries.		
1850 ..	..	..	4,665	
1851 ..	..	..	6,997	
1852 ..	..	..	7,320	
1853 ..	1	1	3,151	
1854 ..	1	1	2,868	
1855 ..	6	8	2,523	
1856 ..	5	5	2,277	
1857 ..	5	5	3,236	Melbourne
1858 ..	2	3	6,460	
1859 ..	2	3	3,848	
1860 ..	2	2	2,749	
1861 ..	2	2	1,320	
1862 ..	..	1	1,638	
1863 ..	1	1	5,964	
1864 ..	1	2	7,684	
1865 ..	2	2	6,411	
1866 ..	2	3	3,029	
1867 ..	1	2	2,513	
1868 ..	..	4	2,052	Melbourne
1869 ..	1	1	1,565	
1870 ..	2	3	2,620	
1871 ..	6	6	23,062	
1872 ..	..	1	19,022	Bendigo
1873 ..	1	2	2,308	
1874 ..	..	..	2,084	
1875 ..	1	1	849	
1876 ..	2	4	2,468	
1877 ..	4	6	4,278	Sydney
1878 ..	2	3	1,856	
1879 ..	3	3	536	
1880 ..	1	4	648	
1881 ..	..	2	3,698	Sydney
1882 ..	2	3	1,317	
1883 ..	1	2	957	
1884 ..	2	2	2,216	Sydney and Melbourne
1885 ..	..	2	2,827	
1886 ..	..	2	275	
1887 ..	..	2	506	Launceston
1888 ..	..	7	1,026	
1889 ..	..	1	23	
1890 ..	..	2	16	
1891 ..	2	5	49	
1892 ..	1	4	431	
1893 ..	3	9	1,457	Perth
1894 ..	..	3	820	
1895 ..	1	10	223	
1896 ..	1	3	541	
1897 ..	2	2	25	
1898 ..	1	4	253	
1899 ..	1	2	174	
1900 ..	..	2	85	
1901 ..	..	3	356	
1902 ..	..	5	2,464	
1903 ..	..	4	760	Launceston
1904 ..	1	4	507	
1905 ..	..	1	116	
1906 ..	..	1	21	
1907 ..	..	1	10	
1908 ..	..	5	12	

The parallel columns, shewing the numbers of infected vessels which have arrived in Australia from England and from other countries gives sufficient evidence, when studied with the details given for each vessel, of the grave menace to Australia offered by the Asiatic countries where small-pox is always prevalent.

This table shows a rough degree of coincidence between the two sets of facts, more especially in the years 1855-6, 1871, 1877, 1893.

It is, perhaps, inadvisable to lay too much stress upon this connexion between the two series of events, and even if the relationship did exist it might be urged that such relationship might have been expected. That the probability of the infection of small-pox overflowing on to outward bound vessels was directly dependent upon the amount of infective material existing in the country of origin, appears to be almost too obvious for comment, and yet when the small numbers of cases that actually did occur on the vessels, and the very extended and scattered area from which the ship's company came is remembered, it is at any rate very interesting to find concrete confirmation of the speculative "what might have been expected." No harm will have been done if the demonstration of the loose connexion between epidemics in a country and occasions of menace to Australia serves to confirm the authorities in the procedure which would naturally be adopted, viz., increased vigilance when small-pox is epidemic in a country from which vessels come to Australia. It is also interesting to notice that the years of epidemic prevalence in Australia correspond with the years of epidemic prevalence in England. There is considerable evidence that Australia has become invaded only at times when there has been unusual pandemic prevalence of small-pox throughout the world, and the table given is an indication of this, although the confirmatory evidence is too extensive to be reproduced here.

There have now been considered the principal factors external to the vessels themselves. Considerable information may be derived from a study of the behaviour of the disease after it has made its appearance on the vessel.

The conditions on board ship are, from the epidemiologists' point of view, in many ways unique. Certain influences, *e.g.*, phenomena connected with pollution of the soil, which are highly important on land in connexion with some infectious diseases, do not exist on board ship, while on the other hand the density of the population is in many instances much greater than on shore. The absence of trained medical advice in some instances, and the almost invariable impossibility of obtaining a consultant's opinion, are factors of no small importance.

Due regard must therefore be paid to the special circumstances in any analysis of the facts available.

As has been the experience right through the study of this subject, the records are in many instances so incomplete that consideration of certain aspects of the subject has to be limited to a chosen few of the vessels mentioned.

Of the total (182), it is necessary to discard completely 46, as there is not sufficient information to justify any deduction either in regard to the behaviour of the disease or the factors controlling such behaviour.

The remaining have been classified according to the numbers of cases which occurred on board during the voyage or during the period of quarantine in Australia.

The table hereunder shows the numbers of vessels on which the specified numbers of cases occurred :—

Number of Cases.							Vessels.
1	..	..	..	..	..	..	58
2	..	..	..	..	..	..	23
3	..	..	..	..	..	..	16
4	..	..	..	..	..	..	7
5	..	..	..	..	..	..	5
6	..	..	..	..	..	..	5
7	..	..	..	..	..	..	4
8	..	..	..	..	..	..	5
9	..	..	..	..	..	..	2
10	..	..	..	..	..	..	1
12	..	..	..	..	..	..	1
14	..	..	..	..	..	..	3
17	..	..	..	..	..	..	1
20	..	..	..	..	..	..	1
25	..	..	..	..	..	..	1
26	..	..	..	..	..	..	1
33	..	..	..	..	..	..	1
113	..	..	..	..	..	..	1
							—
							136
							—

Of the 136—

58, or 42·65 per cent. had only one case.

81, or 59·56 per cent. had less than three cases.

97, or 71·32 per cent. had less than four cases.

There is thus elicited a very striking fact. These vessels carried a total of many hundreds, in fact thousands, of persons who were together on the vessel for at least five weeks, and yet on each of 71 per cent. of them less than four cases developed, and in more than half of them only one case or two cases occurred. In only six of the total 136 were there more than fourteen cases. Probably the average number of persons on these ships over the whole period would be about 500, and these 500 were crowded together, especially on the emigrant ships and in the third class on mail steamers, so closely as to offer very favourable conditions for the spread of a disease like small-pox. The student is faced with two sets of facts. On the one hand are vessels such as the *Tudor* (No. 91, p. 81), the *Macduff* (No. 112, p. 83), and the *Preussen* (p. 92), in which the infection spread widely and attacked a large proportion of the ship's company; and on the other hand is the long list of vessels in which only one, two, or three cases appeared.

It is clear that the disease behaved differently on these three vessels from the 97 in the other group, and it becomes necessary, if the lesson offered by this varying behaviour is to be utilized, that an attempt be made to discover what factors or reasons produced this varying behaviour.

Again, the occasion to regret the incompleteness of the records presents itself. In the large majority the records consist merely of a statement that so many people were on board and so many were attacked, but for some of the vessels there are statements made which allow of certain deductions of limited application being made.

It will probably be well at this stage to consider these cases and see whether any useful deductions may be legitimately drawn—

The *Morning Light* (No. 92, p. 81.) 395 persons on board. Only one small-pox case developed. The measures of isolation taken in this case were such as to call forth special remonstrance from the crew, but they were admittedly effective.

The *Bangalore* (No. 110, p. 82). 358 persons on board. Only one case of small-pox occurred. As soon as the eruption appeared "he was at once transferred to the bridge-house and there strictly isolated."

The *British Sceptre* (No. 114, p. 83). 33 persons on board. A coloured seaman had been attacked. "Owing, however, to the precautions exercised by the captain, the disease did not spread, and the man had been convalescent 50 days before arriving at Melbourne."

The *Sumatra* (149 p. 89). 252 persons on board. A lascar was attacked with small-pox. "This man was recognised as having the disease at an early stage and prompt measures were taken on board to isolate the patient and prevent the disease from spreading.

In each of those four instances only one case occurred, and it will probably be freely admitted that the isolation of the patient was the sole reason for the suppression of the disease, and that the reason why no further case occurred was solely that the focus of infection was so promptly and effectively confined as to remove all possibility of the dissemination of the infection.

Massilia.—During the voyage two cases of small-pox—both lascars—had occurred. One was landed at Aden, the other at Adelaide.

Caledonien.—Two cases occurred—both lascars. One was landed at Adelaide and the other at Melbourne. Although eight other lascars were landed in quarantine at Adelaide, and the others at Sydney, no further cases occurred.

Orizaba.—A third class passenger—a boy of fourteen—was found on arrival at Melbourne to have small-pox. Eight days later the boy's mother developed the disease. No other cases occurred.

Ville de la Ciotat.—A native seaman was landed at Colombo suffering from small-pox. The only other cases that occurred among a company of more than 300, were two Arab stokers.

In these four instances, all of them large passenger vessels, the number of cases was very small—three cases in one instance, and two cases in the other three vessels. But the interesting fact is that the infection was limited to the immediate vicinity of the first case, in three instances. Where a coloured seaman was the first patient, the other patients were coloured seamen also. In the other instance, the only person infected by the first patient was that patient's mother.

It may have been, in the case of the *Caledonien*, that both the patients were infected from the same source, but such a hypothesis cannot hold for any of the other three instances, for the reason that the interval between the two cases was too great.

In these last three instances the isolation of the first patient was either not early enough or complete enough to obviate the spread of infection from that case. This is self-evident, as other cases occurred. The infection must,

therefore, have been for a longer or shorter period uncontrolled, and during this period when it was not under control it obviously displayed only a low degree of infectivity. If it were known that the second cases were invariably persons who for some reason had been especially exposed to the risk of infection, either by attending on, or sleeping in the same cabin as, the patient, it might be expressed that the infection was effective only at short range rather than that it displayed a low degree of infectivity.

The difference between these two variants in relation to the infection of small-pox is not without importance. The disease may, under some circumstances, display a low degree of infectivity, but it could never be safe to assume that such degree would remain constant, and it would always be proper to provide against an exaltation in the infectivity. The range of infection on the other hand is dependent upon factors other than those governing the degree of infectivity. For the sake of illustrating this point, let it be assumed that a person B, comes into continued and close personal contact with another person A, sick with small-pox. Assuming that the factor controlling the spread of the disease was the degree of infectivity and that only persons exhibiting a highly susceptible constitution would be infected. Then B might remain continually in contact with A, and unless he was susceptible he would not contract the disease. On the other hand, assuming that all persons exposed to infection were equally susceptible, then it might easily be that a person brought closely into contact with A (as for example the mother in the *Orizaba* incident), would be much more likely to develop the disease than one who was, say, never less than 10 feet from the patient.

In brief, the position becomes as follows :—The special degree of susceptibility referred to is of course provided by neglect of vaccination, and the question for solution is—“ Is a case of small-pox on board ship liable to attack any susceptible, *i.e.*, unvaccinated person on board without any special regard to the degree of contact, or is the probability that any person will be attacked directly dependent upon the degree of contact he has with the infectious patient ? ”

If it appeared, for example, that small-pox is only effective at short range, *i.e.*, that only those individuals brought into actual personal contact with the patient are liable to attack, then a fact of fundamental importance would have to be recorded.

The eight instances just discussed seem to indicate a short range of infectivity ; particularly in the latter four does it appear that the disease attacked no person outside of that section of the ship's company in which it first appeared.

It will be interesting to discuss the others of the vessels about which definite data are available.—

Taiyuan (No. 65, p. 80) embarked at Japanese ports a number of Japanese passengers. Before the vessel left Hong Kong for Australia, eight cases of small-pox had occurred amongst these Japanese. The whole of these Japanese passengers (sick and well) were landed at Hong Kong, and thereafter no case occurred amongst the ship's company.

Tsinan (No. 66, p. 80). 91 in number. Had an identical history, except that only two cases occurred among the Japanese passengers

In these two cases, although several persons were attacked, the disease did not spread beyond that limited section of the passengers among which it originated.

Nineveh (No. 161, p. 90). In this instance the captain, third officer, fourth officer, second steward, and pantryman were attacked amongst the crew, while one passenger, a lady aged 55 years, also contracted small-pox.

Nothing very much can be said about this outbreak, as the recorded facts are not complete enough with regard to the degree of contact between the patients. A certain amount of contact between the first three patients is, however, stated to have occurred, and it is interesting to note that the outbreak was, with the exception of the one passenger, confined to two sections of the crew—the engine-room staff, for example, not being attacked.

Duke of Westminster (No. 133, p. 85). Two emigrant girls embarked in London nine and eleven days respectively after their discharge from the small-pox hospital. Three emigrant girls and the chief officer were subsequently attacked.

British Enterprise (No. 129, p. 84). A kanaka, evidently infected in London, developed small-pox shortly after leaving London. He was allowed to sleep in a sailor's berth. The sailor in whose berth he slept was the next to show the disease, and subsequently four others of the crew were attacked. The vessel was an emigrant ship, but in spite of this fact the only passenger attacked was a young woman of eighteen.

Baroda (No. 147, p. 88). A lascar was first attacked and removed at Adelaide, and approximately a fortnight later the second officer showed the disease in Sydney.

Cloncurry (No. 178, p. 100). Three lascars suffering from small-pox were removed at Fremantle; twelve days later another lascar, and a male saloon passenger, were found to be suffering from the disease.

Mirzapore (No. 116, p. 83). The number of cases which occurred on board this vessel is not specified, but it is stated that the first group consisted entirely of a certain family and its attendants, while of the succeeding seven cases two were nurses—presumably in attendance upon the above family.

Donald Mackay (No. 94, p. 81). Among a ship's company of 419 there occurred twenty cases of small-pox. These consisted of one saloon passenger, sixteen intermediate and steerage passengers, and three sailors.

In all these instances the tendency of the disease to limit itself to that section of the ship's community in which it first appeared is very noticeable. The records do not unfortunately supply certain facts essential to the formation of a sound opinion as to the factor limiting the spread of the disease. Of the state of vaccination of the passengers and crew, nothing is now known, but there are strong indications of personal contact in places, *e.g.*, the sailor on the *British Enterprise* and the nurses on the *Mirzapore*; while the possibility of personal contact in the case of the officer on the *Duke of Westminster* and the young woman of eighteen on the *British Enterprise* is not likely to be denied by any one who knows the conditions on shipboard.

There remains now for discussion the group of vessels in which the infection became more or less widespread—

Oroya (No. 177, p. 95). The facts connected with this outbreak have been discussed at length, and the conclusion arrived at was that it would seem to be true of this outbreak that the closer the degree of personal contact the greater the liability of infection, and it would even seem to have been true that without actual personal contact no transmission could occur. But the circumstance that the family of the first case escaped unattacked, which is in direct opposition to the view just expressed, is to be explained by the fact that all the family were well protected by vaccination. So that the two factors appear—Personal contact as the source of danger, and complete protection by vaccination as the source of safety.

The breakdown in the quarantine system, as described on p. 98, is worthy of careful attention.

It must also be noted that all the persons affected among the ship's company were second-class passengers, that is to say, as has been noted in many instances above, the disease did not spread, although entirely uncontrolled by any administrative measures, beyond that section of the ship's community in which it originated.

Ormuz (No. 179 p. 100). In this vessel a seaman, ill with small-pox, was allowed to carry on his duties while in an infectious condition, and as a result, 34 or 35 persons developed the disease. The records are very incomplete and no comment can be made. The quarantine system in this instance carried out the functions for which it was designed. An interesting fact appears relative to those cases which developed at the Quarantine Station at Adelaide; that is, that of the four "secondary" cases, three had been in direct personal contact with the patient, R.B.—two of them being definitely engaged in nursing him. It is difficult to understand how it was that these nurses were allowed to commence their duties without having been re-vaccinated.

Up to this point in this study of the individual vessels, attention has been limited to those vessels which were either infected only to the extent of one or two cases, or although infected to a larger number of cases, yet the cases occurred mostly in one section of the ship's community, and it has been seen that there are reasonable grounds for the hypothesis that the factor controlling the spread of the disease was a short range of infectivity.

There have now to be considered some three vessels in which a widespread infection occurred—

Tudor (No. 91, p. 81). Amongst 211 persons on board, there had been 25 cases of small-pox, two of which were fatal.

Macduff (No. 112, p. 83). Amongst 54 persons on board, eight cases occurred, one of which was fatal. The disease began in the fore-castle, among the coloured seamen, spread amongst the passengers, and finally established itself in the captain's and officers' quarters. The first case occurred only a few days after the ship left London, and the last only five days before the vessel arrived at Melbourne.

On arrival, after a voyage of 81 days, four cases and three convalescents were still on board.

Preussen, with a large company, including 544 steerage passengers. A steerage passenger was infected at Port Said, and at varying dates thereafter, 113 of the ship's company developed the disease, of whom fourteen died.

It is obviously a matter of the first importance to establish if possible, the conditions, whatever they might be, that were favorable to the spread of the infection on these vessels. The position that has been hypothetically assumed is that close personal contact was a condition necessary to the spread of the infection.

How does this apply in the case of these three vessels now under discussion—

Tudor. Of this vessel it is stated in the official records that "these 25 individuals were treated in their berths, and went through all the stages of their disease there. There was no seclusion or separation of the sick from the healthy made or attempted. Some of the passengers stated that in passing to or from their berths they could not avoid coming in actual contact with persons in all stages of the eruption."

Macduff. The official report states—"It may be said that the disease was present on board throughout the entire voyage. The disease was of a very bad type, and the steps that were taken to arrest its progress do not appear to have been either wise or active. The four cases that were landed at Melbourne were the captain, the second officer, and two seamen who were severely attacked within four days of each other, and all four cases within ten days of reaching Melbourne."

In the case of the *Tudor* it is clear that the conditions were such as to encourage personal contact to a very close extent; while on the *Macduff*, although no facts are available as to the extent to which any of the patients came into contact with any of the others, yet two facts are prominent. In the first place, the eight cases were spread out over, approximately, 70 days; or, if the last crop of four be excluded, four cases were spread out over about 65 days, indicating a very slow rate of progress through the ship, and this in spite of the fact that the restrictive measures were "neither wise nor active." In the second place, the epidemic proceeded not indiscriminately through the ship, but in an orderly progression from one group among the ship's company to another.

Preussen.—This outbreak is the worst recorded in the history of shipping coming to Australia. That one case should give rise to 113 others, indicates some special feature on board this vessel. Are there any facts recorded which permit of any conclusion as to the nature of these special features?

The outbreak was so extensive that special reports were presented to their respective Parliaments by the Victorian and New South Wales Boards of Health, and these afford a complete review of the conditions on board the vessel. In the first place, it appears that the vessel was

noticeably insanitary. But especial interest attaches to the measures of isolation. Upon this aspect the reports contain the following information :—

New South Wales Report, page 10 :—

When J. P. was found to be sick he was for some reason at once placed in hospital. This apartment is the most forward of the deck-houses on the upper deck, which, with the partitions enclosing the upper part of the engine space, form the port alleyway. It consists of two cabins, each holding four berths, and each having its own door opening on a little alleyway, the end of which nearest the bulwarks is shut off to hold a water-closet common to both cabins, the other end being closed with a door giving on to the main port alleyway already mentioned. The forward partition of the forward cabin forms, therefore, a part of the boundary of that part of the upper deck which, roughly speaking, is round the fore hatch; and it is pierced with a port. Pryce lay sick in this forward cabin and under this port, which was not specially railed off, though it is true that a cow was tied up under it for a part of the time; and the deck outside was a part of the promenade space allotted to the steerage passengers. Hans Vung, the Norwegian, was in this cabin, too, suffering from dysentery, and he continued to share it with J. P. until he died on 12th December. The men were not separated, because the after cabin was occupied already by Mrs. Hill, a passenger who was also suffering from dysentery. Her husband was at first allowed to go to and fro between the hospital and his quarters in order to wait on her; but as soon as the nature of J. P.'s case was declared, he was confined to the after hospital with his wife. Two stewards were told off to wait on these four persons. Supplies were ordered to be carried to the alleyway between the two hospital cabins and set down in it; then the doors of the two cabins were to be opened and the things taken in. These stewards did not sleep in the hospital; they were assigned a cabin on the starboard side of the main deck amidships; and in going there they must often have come in contact with passengers. The degree of isolation thus attained cannot be fully judged of until the arrangements made on the spar and hurricane decks with regard to passengers have been described. Most of the steerage passengers were placed either on the main decks or between decks forward of the second saloon companion, but a number of single men were put between decks under the quarter hatch, down which there was a ladder for them. Steerage passengers were, therefore, allowed to use the spar deck both forward and in the waist (or round the quarter hatch) and the men lodged aft had to go forward for every purpose except to sleep. For these reasons it was considered necessary to assign one alleyway as a passage of communication for this class, so that the other might be kept for the second class; and the port side (where the hospital stands) was chosen, the starboard alleyway being closed by a door at its forward end. This arrangement was continued even after Pryce's case was known, thus compelling the passengers to pass and re-pass the hospital door. But more than this, the forward part of the hurricane deck, which properly belonged to the second class passengers, was allotted to the steerage; and the entrance to the companion leading to it was nearly opposite the hospital door. Lastly, the ladders leading to the forward stokehole were reached by a door which is exactly opposite the hospital door. Even had the very strictest precautions been observed in keeping the hospital door closed and in preventing the hospital attendants from standing in the alleyway (which I have small reason to suppose was the case) to continue the arrangement described after Pryce was known to have small-pox appears to me to have been most injudicious. Upon the whole, I think it will now be clear that there was no reasonable probability that the so-called isolation described would limit the spread of this disease.

Victorian Report, page 4 :—

On the day J. P. first became ill, he was moved into the hospital cabin, and no other precautions were taken to isolate him. The two stewards who attended him went on with their usual duties without taking any visible precautions. They slept in a cabin in which there were also two passengers. The doctor apparently took no special precautions after small-pox broke out, but in answer to a query was heard to say he always changed his coat.

Dr. Thompson's conclusion is very explicit. There was no reasonable probability that the so-called isolation described would limit the spread of the disease. From the description it is clear that the two sections of the ship's community especially exposed to infection were the steerage passengers and the engine-room staff, especially those engaged in the stokehole. How

does this accord with the incidence of the disease amongst the various sections of the ship? The total *personnel* of the ship was as follows :—

Crew, 120 ;

Stewardesses, 3 ;

Steerage, 439 ;

Saloon passengers—Number not stated, but there were not very many.

The numbers attacked in these various groups can only be stated for those patients under observation at Sydney. These were as follow :—

Second class passengers, 4 ;

Steerage passengers, 61 ;

Engineers, 4 ;

Firemen and coaltrimmers, 5 ;

Seamen, 1 ;

Doctor's attendant, 1 ;

Ship's cook, 1 ;

Carpenter, 1 ;

Purser, 1.

It is thus evident that the groups principally attacked were the engine-room staff and firemen, and the steerage passengers, which were the groups especially exposed to infection. The doctor's attendant naturally came much into contact with the first case (J. P.), and he burned the latter's clothes after his death.

These two groups were not only specially exposed to infection, but the conditions were such that they had to pass and repass in very close proximity, if not in actual contact with, J. P.

This epidemic then offers no new information, but in the main confirms the experience of other vessels. It can hardly be said that an infective agent—a disease organism—which produced 113 cases on board one vessel exhibited a low degree of infectivity, or one which produced thirteen deaths and a large proportion of severe cases had a low degree of virulence.

It almost seems that this vessel may be taken as a good illustration of a statement of the following nature: Given a set of conditions which permit of a large number of persons coming within the immediate neighbourhood, that is to say, within a few feet of a focus of infection, then it may be predicted with a fair amount of confidence that a large number of cases will occur.

The vessels discussed at the beginning of this present review (p. 113) are examples of the reverse set of conditions, and they justify the statement that provided conditions are arranged so that no person can come within close contact with the patient himself (in other words that the patient is promptly and effectively isolated), then no further cases occur.

The intervening vessels offer examples of a graduated progress from the one extreme to the other, and taken altogether they appear to justify the general statement that in the event of one case occurring on a vessel (and almost invariably on these vessels the original source of infection has been a single case) then the number of persons that will be infected from that case is directly dependent upon the number that have been allowed to come within his immediate neighbourhood during the period when he is in an infective condition.

But in what way has vaccination modified the position? Upon this aspect the records are even more silent than upon other important phases. To what extent the passengers on the various vessels were thus protected cannot be ascertained in the majority of cases. When information is forthcoming. *e.g.*, the *Preussen*, it is evident that the ship's community was not different from the general community in the United Kingdom in this respect—in other words, a large proportion of them had not been vaccinated since they were primarily vaccinated in infancy, and a considerable number had never been vaccinated at all.

CHAPTER XIV.

THE EPIDEMIOLOGY OF SMALL-POX IN AUSTRALIA.

The epidemiology of an infectious disease may be described as the discussion of the factors that led to its introduction into the population under consideration, of the factors that encouraged its spread, and of the factors that ultimately led to its disappearance.

INTRODUCTION.

This has been fully discussed in the preceding chapters. As is obvious, of course, the disease has not obtained a footing in Australia until it has been introduced from outside. The circumstances surrounding the several occasions of its introduction have been reviewed in detail, and from that review it appears that although the measures of defence at the frontier (Maritime Quarantine) have been found defective at times, yet there have been other times when no quarantine organization, however perfect, could have prevented the introduction of the disease.

That such occasions as these latter will be many times repeated in the future, is in the nature of things inevitable, and a careful study of the behaviour of the disease under Australian conditions is, therefore, imperative, in order that the probable behaviour in the future may be forecasted and suitably provided against.

SPREAD OF THE DISEASE UNDER AUSTRALIAN CONDITIONS.

It is quite obvious that a disease such as small-pox, which has been known for many centuries, must have been very carefully studied; and it is advisable before commencing the discussion of the facts that have been revealed by a study of the Australian epidemics, that the conclusions arrived at by the successive authorities on this disease in the older countries be carefully considered. A succinct summary of these conclusions is given by Dr. McCombie in Allbutt and Rolleston's *System of Medicine* (1908, Vol. II., Part I., p. 490), as follows:—

Boerhaave, at the beginning of the eighteenth century, first proved that small-pox was spread by contagion exclusively, although its contagious nature had for a long time been known.

It may be communicated from the sick to the healthy by (a) persons suffering from small-pox; (b) bodies of persons who have died of small-pox; (c) infected articles, and perhaps by flies and domestic animals; (d) healthy third persons; (e) by the air to persons living at some distance (aerial infection); (f) inoculation.

(a) Small-pox patients are capable of communicating infection to others, perhaps during the stage of incubation, certainly during the initial stage, and right through the disease, till not a trace is left on the skin of desiccated pustules, scabs, and powdery *debris*. But the infection is much more virulent at certain stages of the disease than in others; it is most virulent during vesiculation, pustulation, and scabbing, less so during the initial stages and the first and second days of rash, and least of all during the incubation stage. The distance at which a single patient may communicate infection to a healthy person varies from the closest contact to a few yards, much depending upon the ventilation of the apartment. As a rule, a susceptible person will be infected merely by entering the room or ward occupied by the patient. The severity of an attack of small-pox appears to be determined more by the personal susceptibility of the recipient of the contagion than by the severity of the disease in the person imparting it.

(b) The bodies of the small-pox dead can communicate infection.

(c) Infected articles, such as bedding, wearing apparel, books, toys, coins, furniture, rags, or anything handled by patients, are capable of communicating infection. Infected

bugs have frequently given rise to outbreaks of small-pox. Flies and domestic animals may possibly be carriers of infection.

(d) Healthy third persons in attendance on patients may communicate infection to others, either by means of their clothing, or by the hair, which readily retains the particles of dried small-pox matter, which permeate the air of the infected room.

(e) It may be conveyed directly by the atmosphere from a small-pox hospital to persons living at some distance. How far is a point on which there is great difference of opinion. Mr. Power, in his investigations at the Fulham Small-pox Hospital, proved that the incidence of small-pox bore a very exact relation to propinquity to the hospital. The incidence on every 100 houses within the special area (a radius of a mile from the hospital) was as follows:—On total area, 6·37; on small circle ($\frac{1}{4}$ mile), 17·35; on first ring ($\frac{1}{4}$ to $\frac{1}{2}$ mile), 9·25; on second ring ($\frac{1}{2}$ to $\frac{3}{4}$ mile), 6·16; on third ring ($\frac{3}{4}$ to 1 mile), 2·57. The influence was greatest when admissions to hospital were beginning to increase. The comparison held good with regard to successive epidemics, and he did not regard the hospital administration as responsible.

Dr. Barry showed that a similar incidence of small-pox around the hospital prevailed at Sheffield during the epidemic of 1887–1888, and some confirmatory evidence of a like character has been obtained from other localities at home and abroad.

On the other hand, many medical officers of health, basing their opinion upon the more recent experience of the incidence of small-pox in the neighbourhood of small-pox hospitals generally, are disposed to regard the validity of Mr. Power's conclusions as open to question. They hold that further knowledge and investigations are necessary before a final judgment can be formulated on this matter.

(f) Inoculation is not practised in civilized countries; it is illegal, and has chiefly a historical interest. Cases of accidental inoculation do, however, occur occasionally, such as inoculation of mother from her infant at breast, or *rice versâ*, and in other ways.

HOW DO THESE VARIOUS FACTORS APPLY IN AUSTRALIA?

(a) Infection from a dead body has been the factor in transmission in at least one recorded case. The porter at the Launceston Hospital removed Duggan's body to the mortuary on 5th June. On the 18th he was admitted as a patient with fever, vomiting, and headache. (*See p. 62*).

(b) Infected articles have on several occasions been the infecting agents, *e.g.*, the incident in connexion with the *Cloncurry* (p. 53); the fact that the laundress at the Launceston Hospital became infected by Duggan's clothing, and other few instances where suspicion attached to infected articles. Seeing, however, the very large number of infected articles there must have been during the period under review, and the remarkably few occasions when infected articles, in the absence of a human infecter, have been shown to be responsible for the spread of the disease, it must be concluded that under Australian conditions inanimate articles have not played, as carriers of infection, the principal, and probably, not even an important part in the spread of the disease.

(c) Healthy third persons may or may not have acted as carriers of infection without taking any harm to themselves. The records throw no light on that point, and no definite statement is possible.

(d) Inoculation has not been shown to have played any part in the Australian incidence of small-pox.

(e) Aerial convection of small-pox has received the complete endorsement of so authoritative a body as the Local Government Board of England.

There are naturally many difficulties in the way of any dogmatic expression of opinion on such a subject.

It may be said at once that the only Australian epidemics which offer the least appearance of support to this hypothesis are the 1868–9 Melbourne epidemic, and the 1893 Perth epidemic.

In the Melbourne epidemic, the zone around the Immigration Hospital, where Webster and the other patients were lying, produced several cases, and from the moment when the use of the hospital was discontinued no further cases arose from that area.

Dr. McCrae, who investigated the circumstances at the time, says "it is impossible, in the face of these facts, to accept the conclusion that the disease of small-pox was disseminated on this occasion by contagion through the atmosphere."

He then discusses the probability of the disease having been conveyed by flies, and is inclined to support that hypothesis. As has been shown, however, there are good reasons for viewing this hypothesis with disfavour.

On the whole, it must be admitted there is little evidence, other than pure speculation, to support the hypothesis that the infection in 1868-9 in Melbourne was "air-borne."

The locality-distribution of the cases that occurred during the epidemic in Perth is shown on the map facing page 68. This map appears at first sight to support the hypothesis first advanced by Power, that the number of cases bore a definite relationship to the distance from the focus of infection.

The original case, the Cingalese, was admitted to the hospital on 21st March, and no other case appeared until the nurse developed the disease on 3rd April. All the successive cases, as far down the list as case 13, occurred before 15th April, that is to say: cases 2 to 13 must have been infected from the Cingalese, for there is no reason to suppose that any other cases existed at this stage.

The Isolation Hospital was not opened until 14th April, so that any cases developing up to 26th April may have been infected from these three cases in the neighbourhood of the hospital. All the cases up to and including case 37 developed before 26th April. It is therefore possible that the original Cingalese is responsible for the majority of the cases, and that the infection was borne by the air or through the air by flies.

On the other hand the Cingalese sickened on 19th March, and was not removed to hospital till 21st March, and may therefore have been infectious before his removal. It is seen from the map that case 3 lived almost next door to the Cingalese, and it is stated in the *West Australian* (newspaper), of 7th April, 1893, that case 3 washed some of the infected clothing belonging to the Cingalese. However, the Cingalese was isolated on 21st March, and within the next sixteen days no case, except the nurse, developed. It is, therefore certain that the infection began to spread after the Cingalese was admitted to hospital.

There is no direct evidence as to sequence of personal contact between successive patients, and it must therefore be said that such facts as are available are not unfavourable to the hypothesis of the spread of infection through the air, without the aid of any human intermediary, but that the facts are not complete enough to warrant any dogmatic statement.

(f) That the factor of predominating importance in the spread of small-pox in Australia has been personal infection from man to man has been shown repeatedly in the history of the disease as recorded in these pages.

That this is universally so has, as a matter of fact, never been doubted. The point upon which the Australian experience may differ somewhat from

that in other countries is, that there is considerable evidence to support the hypothesis that the disease has in Australia shown, as a general rule, a very short range of infection, and that actual personal contact is ordinarily necessary for the contraction of infection. The statement as quoted from Allbut and Rolleston, that "As a rule a susceptible person will be infected merely by entering the room or ward occupied by the patient," has not applied under the conditions under which in the past small-pox has been met with in Australia.

This short range of infectivity is undoubtedly the explanation of the failure of the disease to spread, *e.g.*, in the Sandhurst outbreak in 1872, and the *Gracchus* passenger in 1903, and must also be held to explain the comparatively small numbers of cases that occurred with each epidemic, and the rapidity with which epidemics were controlled when once the repressive measures of isolation and vaccination were vigorously and thoroughly imposed.

SEASONAL DISTRIBUTION OF THE EPIDEMICS.

The principal epidemics that have occurred in Australia are set out in the following table :—

Year.	Season.	Locality.	Cases.	Deaths.	Cost.
					£
1. 1857 ..	October–November ..	Melbourne ..	16	4	..
2. 1868 ..	November–May ..	.. ..	43	10	330
3. 1872 ..	July–August ..	Bendigo ..	7	Nil	919
4. 1877 ..	December–January ..	Sydney ..	12 (?)	3 (?)	..
5. 1881 ..	May–February ..	.. ..	154	40	84,143
6. 1884 ..	August–March ..	.. ..	64	4	32,596 (?)
7. 1884–5 ..	April–April ..	Melbourne ..	56	6	..
8. 1884 ..	July ..	Border Town ..	3	..	497
9. 1887 ..	August–October ..	Launceston ..	33	11	..
10. 1893 ..	April–May ..	Perth ..	52	9	20,000
11. 1903 ..	June–August ..	Launceston ..	66	19	20,000

It will be noted that there have been eleven distinct epidemics in Australia, but that there is no sort of regularity in the seasonal occurrences of the epidemics.

Is there any controlling factor in the yearly distribution of the epidemics ? The first three were certainly, and the fourth probably, introduced definitely by a ship of which the identity is definitely known.

Then comes the period of eight years, 1881–1887, during which there were five definite epidemics, a number of scattered cases, and a still greater number of doubtful cases, of cases of chicken-pox, and of epidemics of the latter disease.

While it will be impossible after the lapse of so many years to make any dogmatic assertion on the point, yet the facts available render it reasonably legitimate to say that small-pox was probably endemic in Australia for those eight years at any rate. To what extent the epidemics in Victoria (1884) and Tasmania (1887) were related to the Sydney outbreak of 1881 will never now be determined. There can be little doubt that cases of small-pox occurred and remained unrecognised in Adelaide in 1882. There is no doubt that the Border Town outbreak of 1884 was merely part of the Victorian outbreak, and there is considerable warrant for believing that the 1884 outbreak in Victoria was part of the general endemic of that time and was not connected with the arrival of the *R.M.S. Rome*.

An interesting speculation is afforded by the death records for the diseases small-pox and chicken-pox. These returns were furnished by the Registrar-Generals for the various States whose courtesy is gratefully acknowledged. They are given in the table hereunder. It is seen that the numbers of deaths from small-pox are as already specified, but that there is a continual succession of deaths from chicken-pox. It is a matter of common knowledge that chicken-pox is very rarely fatal and, therefore, is a matter for speculation what exactly these deaths represent. They may be cases of syphilis with an eruption, of impetigo, or even unrecognised small-pox—though this latter is unlikely. There is no evidence upon which to base an opinion, and, therefore, it is impossible now to do more than accept the figures as they stand.

The following record of a fatal case of uncomplicated chicken-pox by Dr. W. B. Nisbet, of Townsville, is, however, worth recording :—

It appears to be a generally accepted fact that varicella is such a trivial disease, and one so devoid of danger, that no treatment is required, and as complications or sequelæ are extremely rare, no precautions are necessary to prevent its occurring.

West says :—"The disease is one so devoid of danger, that it hardly requires any treatment." Fenwick states the prognosis is always favorable. While Collie, in *Quain's Dictionary of Medicine*, definitely states "no physician has recorded a fatal case of chicken-pox."

This must be my excuse, therefore, for putting on record the following case, which otherwise might seem too trivial to be worthy of note :—

E.C., a healthy baby girl of eight and a half months, showed signs of the eruption of chicken-pox on 30th September, 1894. Four other children in the house also had it, and an epidemic of the disease was running through the town at the time, so diagnosis was a matter of no difficulty. For the first three days the case progressed in the ordinary way, the rash being by no means copious, and the constitutional disturbance unimportant. But on the fourth day a new crop of vesicles made their appearance, and were so numerous that by the sixth day every part of the child's body was covered, even the soles of the feet and the palms of the hands. The eruption showed no tendency to become confluent, excepting over the back, due to this part being rubbed by the restlessness of the child as it lay. On the seventh day numerous spots appeared on the tongue, hard and soft palate, and inside of the cheeks, these changed to irritable ulcers on the ninth day, causing great distress, and on the morning of the tenth day the child died without any other complication making its appearance.

The temperature remained at or about 102 degrees during the illness, only once, on the evening of the fifth day, reaching 103 degrees. The evening of the ninth day it fell to 98·8, and remained normal up to the time of death the following morning.

The opinion I formed was that death took place from the immense area of skin involved, in the same way as a burn over a large area produces death from shock in a child. The exhaustion evidently was so great that at the crisis of the complaint when the temperature fell to normal, no amount of artificial stimulation could avert the fatal issue.—(*Australasian Medical Gazette*, 15th November, 1894, p. 367.)

DEATHS FROM SMALL-POX AND FROM CHICKEN-POX.

New South Wales.—Statistics available from 1875–1910.

SMALL-POX.

—				Males.	Females.
1877	..	..	..	..	4
1881	..	..	..	9	8
1882	..	..	..	12	11
1884	..	..	..	2	1
1885	..	..	..	1	1
1887	..	..	..	8	5
1888	..	..	..	1	1
1892	..	..	..	1	..
1894	..	..	..	1	..
1910	..	..	..	1	..

CHICKEN-POX (no records).

Deaths from Small-pox and from Chicken-pox—*continued.**Victoria.—Statistics from 1851–1910.*

—				Small-pox.	Chicken-pox.
1857	..	..	..	5	..
1858	..	..	..	1	1
1859	..	..	..	..	1
1860	..	..	..	..	4
1861	..	..	..	..	3
1862	..	..	..	..	..
1863	..	..	..	..	1
1864	..	..	..	..	3
1865	..	..	..	..	1
1866	..	..	..	..	1
1867	..	..	..	..	1
1868	..	..	..	2	1
1869	..	..	..	8	5
1870	..	..	..	..	2
1871	..	..	..	..	1
1872	..	..	..	1	4
1873	..	..	..	..	2
1874	..	..	..	1	1
1875	..	..	..	..	3
1876	..	..	..	..	2
1881	..	..	..	..	2
1882	..	..	..	2	..
1883	..	..	..	..	1
1884	..	..	..	2	2
1885	..	..	..	2	1
1886	..	..	..	..	2
1887	..	..	..	1	3
1888	..	..	..	..	1
1889	..	..	..	..	..
1890	..	..	..	..	2
1891	..	..	..	..	2
1892	..	..	..	..	2
1893	..	..	..	..	3
1894	..	..	..	..	2
1895	..	..	..	..	1
1898	..	..	..	..	2
1899	..	..	..	1	4
1900	..	..	..	..	..
1901	..	..	..	1	..
1902	..	..	..	..	1
1903	..	..	..	..	..
1904	..	..	..	..	..
1905	..	..	..	..	..
1906	..	..	..	..	2
1907	..	..	..	..	..
1908	..	..	..	..	..
1909	..	..	..	..	..
1910	..	..	..	..	..

Tasmania.—Statistics from 1870–1910.

—				Small-pox.	Chicken-pox.
1871	..	..	..	..	1
1877	..	..	..	..	1
1879	..	..	..	..	1
1883	..	..	..	..	1
1887	..	..	..	11	..
1903	..	..	..	19	..

South Australia.—Statistics from 1864–1911.

—				Small-pox.	Chicken-pox.
1867	..	..	..	..	1
1890	..	..	..	..	3
1891	..	..	..	..	1
1892	..	..	..	..	2
1893	..	..	..	..	2
1898	..	..	..	1	..
1899	..	..	..	..	1
1901	..	..	..	1	..
1902	..	..	..	..	1
1905	..	..	..	..	1

Queensland.—Statistics from 1870–1910.

—				Small-pox.	Chicken-pox.
1870	..	..	..	..	1
1872	..	..	..	..	1
1875	..	..	..	..	2
1876	..	..	..	..	1
1877	..	..	..	1	..
1882	..	..	..	..	1
1885	..	..	..	..	2
1891	..	..	..	..	3
1892	..	..	..	1	..
1893	..	..	..	..	1
1894	..	..	..	..	2
1899	..	..	..	..	1
1901	..	..	..	..	1
1902	..	..	..	..	2
1905	..	..	..	..	1
1906	..	..	..	..	1

Western Australia.—Statistics from 1840–1910.

—				Small-pox.	Chicken-pox.
1888	..	..	..	..	1
1893	..	..	..	7	..
1894	..	..	..	2	..
1897	..	..	..	..	1
1900	..	..	..	..	1
1901	..	..	..	1	1
1909	..	..	..	1	..

A very interesting feature in connexion with the study of the history of small-pox in Australia is the purity of the epidemiological factors. In other countries, and in connexion with other epidemic diseases, even with small-pox itself, much attention has been paid to the “exhaustion of susceptible material” during epidemics and the accumulation of susceptible material

between epidemics. Such can have played no part in Australia, for the number of cases—about 500 in all—cannot have had much effect on about 5,000,000 births, and consequently the accumulation of susceptible material has been going on all the time.

The percentage of the general population that has been “truly susceptible,” *i.e.*, unvaccinated, has remained almost constant so far as crude methods of estimation indicate, and vaccination has been able to oppose a “one-in-three” barrier to the progress of the disease. That is to say, the infection in its attempt to spread from any given focus finds itself confronted with six roads, two of which are partially—but not completely—blocked, while the other four are quite open—a barrier which is rather illusory than effective.

Dr. Ashburton Thompson concisely and lucidly discussed the situation as follows :—

To some casual local spread of contagious disease, two conditions alone are necessary, *viz.*, the presence of the specific contagium, and of personal and local susceptibility. Against epidemics of small-pox thus arising our limited quarantine, or policy of isolation with vaccination, is, doubtless, a sufficient protection usually. But to pandemic extensions of disease, at all events, and probably therefore to any wide and uncontrollable spread, even in a particular city, a third condition is necessary. What that is is not yet known; although it may fairly be supposed to consist in conditions which prolong the life of the contagion after it has parted from the animal body in which it has been propagated. But its existence may be inferred from the observation that whereas small-pox is endemic in many places, yet it becomes formidable only from time to time. Now, if such accessions of virulence were merely local, they might be accounted for by accumulations of susceptible persons, newly-born for the most part since the last preceding outbreak, when the then susceptible either got immunity by suffering or were killed off. But it is not in isolated spots that such accessions are observed as a rule; on the contrary, many widely separated places begin to suffer about the same time; and hence it must be concluded that a third, not local, condition is necessary to them. This being so, if we have hitherto escaped any serious epidemic of small-pox here, clearly that is because the third condition has never coincided with the other two. For we exhibit a full measure of personal susceptibility, since, as I calculate, there are at present in this city alone at least 100,000 unvaccinated persons, reckoning those only who are under twenty years of age; while the specific contagium has been often introduced, and must continue to be introduced from time to time in the future, in spite of the greatest possible watchfulness at quarantine, and in spite of the arrest of all but a very few undiscoverable cases. The outbreak of 1881 seems to me a conspicuous example of the absence of the third condition, for although there were then in the city, I reckon, not less than 234,000 unvaccinated children under five years of age alone, and although the contagium remained alive and active for about eight months, yet no more than 154 persons are known to have suffered out of a population of about 28,000.—(*Journal of the Royal Society of New South Wales* 1887, p. 231.)

The determination of that third factor is naturally a matter of importance. From the evidence recorded throughout this volume, there would appear to be some grounds for the hypothesis that the third—and also the controlling—factor under Australian conditions has been the absence of sufficient aggregation of population to permit of a spread of the disease so rapidly as to become beyond control. In other words, the disease has spread slowly and to a short distance because the population has not been sufficiently crowded to permit of large numbers of susceptible people coming into actual personal contact with the patient. In the official report of the 1881 epidemic in Sydney the factors assisting in the spread of the disease are enumerated, and the factor placed first in order of importance is “over-crowding.”

So in all the epidemics, complete and comparatively rapid suppression has been obtained by isolation and vaccination (vaccination being really another and indirect means of isolation).

Where the aggregation has been great, *e.g.*, the *Prussen* outbreak, or the opportunities for personal contact frequent, then the spread has been sometimes rapid.

Not only, however, is the converse true, *i.e.*, that where there have been no opportunities for personal contact there has been no spread, but it has even been that where there has been the possibility of a certain amount of contact there has sometimes been no spread. Therefore is the hypothesis enunciated that the controlling factor has been a short range of infectivity.

The deduction from this is obvious—that, with the increase of population in Australia, the liability to the spread of small-pox, if introduced, becomes ever greater.

CHAPTER XV.

VACCINATION IN AUSTRALIA.

It is obviously necessary in any study of small-pox, and its possibilities in relationship to Australia, to consider the condition of the Australian population in respect of their protection by vaccination from the invasion of small-pox.

Table J. shows the numbers of successful vaccinations which are recorded for each of the States, for the years shown, and also the numbers of births for the corresponding years.

The figures for the births are taken from statistics issued by the Commonwealth Statistician.

TABLE J.

VACCINATIONS.

Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.
1851	986	..	..	..	..	..	1882	2,188	20,081	..	6,262	998	1,692
1852	1,329	..	..	..	..	..	1883	882	18,536	..	9,895	749	1,665
1853	2,885	..	..	..	..	..	1884	7,055	21,317	..	10,261	1,115	1,517
1854	1,842	..	..	2,632	..	..	1885	2,230	20,818	..	7,431	\$700	1,597
1855	964	..	..	1,666	..	..	1886	1,763	21,506	..	5,882	||800	1,357
1856	1,523	..	92	2,808	..	..	1887	3,230	25,855	..	8,028	..	4,176
1857	3,640	..	..	3,110	..	..	1888	2,186	23,071	..	10,177	..	944
1858	3,232	..	82	3,633	..	..	1889	2,404	25,331	..	8,073	..	912
1859	1,580	..	81	4,225	..	..	1890	2,197	25,502	..	9,091	..	180
1860	1,584	..	..	2,997	..	..	1891	1,567	25,538	..	8,187	..	6
1861	2,349	..	..	2,803	..	..	1892	4,014	26,904	..	9,509	..	144
1862	3,155	..	..	3,214	..	..	1893	2,547	25,697	..	7,177	..	99
1863	12,970	..	..	5,449	..	..	1894	1,957	25,441	..	9,029	..	19
1864	10,696	..	..	3,649	..	..	1895	2,437	23,429	..	7,636	..	83
1865	8,367	..	..	5,295	..	..	1896	945	24,343	..	6,430	..	68
1866	7,606	..	..	1,205	..	..	1897	245	21,596	..	6,331	..	26
1867	6,931	..	..	4,285	..	..	1898	592	14,665	..	5,605	..	440
1868	11,237	..	..	4,596	..	..	1899	1,197	16,630	..	4,854	..	**44
1869	21,507	..	..	5,594	..	..	1900	910	20,695	..	5,588	..	1,162
1870	7,084	..	..	4,407	..	..	1901	2,081	19,243	..	4,350	10,000	1,384
1871	6,482	..	..	4,828	..	..	1902	896	16,117	..	1,906	..	3,296
1872	17,565	..	..	..	..	..	1903	605	20,935	..	1,857	..	24,857
1873	3,152	22,736	..	8,644	..	..	1904	20	20,548	..	1,476	..	53
1874	4,832	22,291	..	7,869	..	..	1905	32	20,116	..	1,142	6,000	203
1875	3,111	21,927	..	*738	..	..	1906	42	20,539	..	980	..	..
1876	4,361	21,504	..	..	718	..	1907	39	20,902	..	3,165	..	..
1877	16,881	22,559	..	..	456	9,289	1908	42	20,924	..	1,502	..	..
1878	3,512	21,778	..	..	†460	724	1909	11	21,344	..	1,477	..	..
1879	5,569	22,100	..	..	1,497	256	1910	..	..	..	..	..	..
1880	5,029	19,132	..	..	†850	404	..	..	..	..	..	..	..
1881	61,239	27,245	..	..	917	12,433	..	287,514	808,895	255	249,948	25,260	68,630

* January-June only.

† This figure is a purely arbitrary interpretation of the following extract from the Annual Report of the Colonial Surgeon—"There was a slight improvement on the preceding year as to the number of successful cases."

‡ This figure is an arbitrary interpretation of the following extract from the same source as †—"the number fell considerably short of the number of births registered"—The number of births was 933.

§ The only record of the number of vaccinations is as follows (same source as † and ‡): "The Vaccination Act continues to be carried out with fair success. Consequently the figure 700 is purely hypothetical. The number of births was 1,206.

|| The reference for this year is "little more than 50 per cent. of the births." The number of births was 1,466.

¶ 168 adult Chinese were also vaccinated. These have not been included.

** 80 adult Chinese were also vaccinated. These have not been included.

Table J—*continued.*

BIRTHS.

Year.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Total Commonwealth.
1860	14,233	22,863	1,236	5,568	588	3,238	47,726
1861	14,681	23,461	1,423	5,551	585	3,207	48,908
1862	15,434	24,391	1,702	6,075	628	3,149	51,379
1863	15,679	23,906	2,221	5,966	597	2,998	51,367
1864	16,881	25,680	2,883	6,208	763	3,031	55,446
1865	17,283	25,915	3,532	6,672	690	3,069	57,161
1866	16,950	25,010	4,127	6,782	710	2,805	56,384
1867	18,317	25,608	4,476	7,041	754	2,971	59,167
1868	18,485	27,243	4,460	7,247	740	2,990	61,165
1869	19,243	26,040	4,654	6,976	751	2,859	60,523
1870	19,648	27,151	4,905	7,021	853	3,054	62,632
1871	20,143	27,382	5,205	7,082	760	3,053	63,625
1872	20,250	27,361	5,265	7,105	828	3,013	63,822
1873	21,444	28,100	5,720	7,107	809	3,048	66,228
1874	22,178	26,800	6,383	7,696	876	3,097	67,030
1875	22,528	26,720	6,706	7,408	760	3,105	67,227
1876	22,298	26,769	6,903	8,224	918	3,149	69,261
1877	23,851	26,010	7,169	8,640	912	3,211	69,793
1878	25,328	26,581	7,397	9,282	871	3,502	72,961
1879	26,933	26,839	7,870	9,902	977	3,564	76,085
1880	28,162	26,148	8,196	10,262	933	3,739	77,440
1881	28,993	27,145	8,220	10,708	1,020	3,918	80,004
1882	29,702	26,747	8,518	10,844	1,089	4,043	80,943
1883	31,281	27,541	9,890	11,173	1,058	4,259	85,202
1884	33,946	28,850	10,679	11,847	1,094	4,578	90,994
1885	35,043	29,975	11,672	12,046	1,200	4,637	94,573
1886	36,284	30,824	12,582	11,177	1,466	4,627	96,960
1887	37,236	33,043	13,513	10,831	1,557	4,736	100,916
1888	38,525	34,503	14,247	10,510	1,518	4,777	104,080
1889	37,295	36,359	14,401	10,318	1,594	4,757	104,724
1890	38,960	37,578	15,407	10,364	1,561	4,813	108,683
1891	39,458	38,505	14,715	10,752	1,786	4,971	110,187
1892	40,041	37,831	14,903	10,570	1,848	4,965	110,158
1893	40,342	36,552	14,394	10,706	2,112	5,216	109,322
1894	38,951	34,258	13,977	10,499	2,123	4,852	104,680
1895	38,774	33,706	14,874	10,567	2,373	4,790	105,084
1896	36,606	32,178	14,017	10,048	2,782	4,603	100,134
1897	37,247	31,310	14,313	9,562	4,021	4,684	101,137
1898	36,222	30,172	13,933	8,970	4,968	4,580	98,845
1899	36,461	31,008	13,899	9,422	5,174	4,674	100,638
1900	37,146	30,779	14,801	9,177	5,454	4,864	102,221
1901	37,875	31,008	14,303	9,111	5,718	4,930	102,945
1902	37,835	30,461	14,216	8,947	6,232	5,085	102,776
1903	35,966	29,569	12,621	8,508	6,699	5,080	98,443
1904	38,667	29,763	14,082	9,133	7,176	5,292	104,113
1905	39,501	30,107	13,626	8,868	7,582	5,257	104,941
1906	40,948	30,844	14,019	8,946	7,800	5,333	107,890
1907	42,201	31,365	14,540	9,238	7,712	5,291	110,347
1908	42,458	31,097	14,830	9,790	7,755	5,615	111,545
1909	43,782	31,544	15,552	10,091	7,602	5,500	114,071
1910	45,444	31,437	16,169	10,580	7,585	5,586	116,801
..	..	..	..	..	..	..	4,368,667

The figures respecting vaccinations are collected from various sources. For the most part they are extracted from annual reports presented to Parliament by Chief Medical Officers, Boards of Health, &c.

For the figures for South Australia for the years 1882–1900 I am indebted to the courtesy of the Registrar-General of that State.

The figures for Queensland for the years 1856, 1858, 1859, are taken from the annual returns for the Colony of New South Wales for those years, for this was at a time before the separation of Queensland from New South Wales.

Some comment is called for upon the figures for Western Australia for the years 1902-1909. In the former of these years the Annual Report of the Principal Medical Officer states as follows :—

For a number of years past the Vaccination Act was practically ignored. In September, 1900, I put the Act into active operation, with the result that since then to date 10,000 children have been vaccinated. There are still in the State several thousands of unvaccinated children under the age of 7 years.

For the four years, 1899-1902 inclusive, the number of births was 22,578, so that the statement above means that nearly half of all the children born in the years mentioned were vaccinated. To any one who knows the conditions, it will be obvious that this is merely a guess, and that the probability is that the estimate is very much too high. In the year 1909 also the Annual Report of the Principal Medical Officer contains the statement that "only about 10 per cent. of those born in this State in recent years have been vaccinated." This also can only be a guess, and is also probably a very high estimate.

In one of the early Tasmanian reports it is stated "that from 1868-1877 vaccination was entirely suspended in that State, and it was re-introduced in the latter year because of the outbreak in Sydney at that time." No figures prior to 1868 have, however, been found.

The totals may not be taken as being the absolute totals of vaccinations performed, for there must have been many hundreds of persons vaccinated by private medical practitioners of which there exists no official record. The report of the Queensland Board of Health, quoted on p. 139, states in 1877 "vaccination is being very widely carried out," yet there exists no record of the numbers so vaccinated. In the *Australasian Medical Gazette* for 1881, p. 31, the following remark appears :—"120,000 persons in South Australia have been vaccinated during the last two months."

These unrecorded vaccinations would greatly increase the totals and consequently the apparent percentage of persons vaccinated, but, as there is no means of ascertaining their number and no possibility of forming an estimate, it will be necessary to confine attention to the figures officially recorded.

Taking the totals for all the years shown, it appears that the total number of births has been 4,368,667, and the total vaccinations recorded 1,440,434. That is to say, on this crude basis 32·9 per cent. of persons born in Australia since 1860 have been vaccinated.

If, however, it be considered that this period is, for any reason, too long, then for the 30 years 1881-1910 inclusive, the figures are :—

Total births, 3,083,337 ;

Total vaccination, 982,090.

In this case the percentage is 31·8.

There is therefore no material difference between the percentage of vaccinations for the last 30 years and that for the last 50 years.

Roughly speaking, it may be said that at least 30 per cent. of all persons born in Australia have been vaccinated.

The question at once arises—Does this percentage represent the percentage of the present population which has been vaccinated? It is, of course, impossible to say. The crude method of estimation does not take any

account of such factors as the number of persons that have died, or the number of persons that have entered Australia from outside.

So far as the former of these two points is concerned, little can be said, except that there is no reason to suppose that either the vaccinated or unvaccinated persons should exhibit a greater mortality rate than the other group; and of the second point, all that can be said is that during the 50 years 1860–1910, the excess of immigration over emigration was 505,975—a number which would not greatly affect the percentages; and it is reasonable to assume that a large proportion of these had been vaccinated.

It would appear, therefore, fairly safe to say, roughly, that 30 per cent. of the Australian population has at one time been vaccinated.

The next point of interest is the condition of the several States with regard to vaccination.

The following are the percentages for the 30 years 1881–1910 of the total number of vaccinations on the total number of births:—

New South Wales	..	..	..	..	9·3 per cent.
Victoria	..	..	..	..	66·4 „
Queensland	..	..	..	..	nil
South Australia	..	..	..	..	54 „
Tasmania	..	..	..	..	39·5 „
Western Australia	..	..	..	..	17·7 „

Setting aside the fact that the Western Australian percentage is much too high, and should in all probability be more like 8 per cent., it appears that three of the States are fairly well protected, but the other three—New South Wales, Queensland, and Western Australia—are very far from being effectively protected, and the gravity of the position rests upon the fact that these are the three States which are most often attacked from without by small-pox.

A perusal of the table offers an interesting sidelight upon an important phase of the question of compulsory vaccination. It would be a matter of great interest if it could be decided whether the widespread objection to compulsory vaccination that unquestionably exists was the result of a reasoned conviction on the part of the bulk of the people that vaccination was either not an adequate safeguard or that its dangers outweighed the advantages; or, on the other hand, whether it was that the general public, while admitting the value of the measure and agreeing with the necessity of its application in times of danger, yet are too apathetic or too little alive to the ever-present danger to insist upon its universal application.

Consider the numbers of successful vaccinations in the various years.

The years 1857–8, 1863–4, 1868–9, 1872, 1877, 1881, 1884–5, 1887, and 1903 were all marked by unusual activity in most of the States, while in Western Australia the year 1879 also was characterized by a number of vaccinations above the average. The latter fact is explained by the passing of a stringent Vaccination Act in Western Australia in 1878.—(*Annual Report, Colonial Surgeon*, 1879, p. 4). Each of the other years mentioned, except 1863–4, was a year when small-pox was epidemic in one or other of the Colonies.

The activity during the years 1863-4 will probably be explained by the following extracts:—

- (a) "In June, 1863, when small-pox was raging in London, I brought under public notice the unprotected state of the children of Tasmania from neglect of vaccination. This subject was brought before the house of Assembly by one of the Members for that City. A Committee was appointed and many medical witnesses examined."—(Extract from *Annual Report by the Superintendent of Vaccinations, Tasmania*, 1867.)
- (b) *Minutes of Evidence of Select Committee on Vaccination, Tasmania*, August, 1863.
Question 11. "How many have you vaccinated since the 30th of June last—that is, since the panic?"
- (c) "The year 1863 was a year of alarm, as frequent accounts of the prevalence of small-pox in different countries was before the public."—(*Annual Report on Vaccination, New South Wales*, 1863-4.)

A similar statement is made in respect of the year 1872: "The number of persons vaccinated during 1872 is, with one exception, the largest recorded in the Colony (New South Wales), and this arose from the fear entertained from the presence of small-pox at New Zealand and Melbourne and on board the *Hero* in the harbor." (See p. 42).

It is therefore quite clear that the general public have no reasoned conviction that the operation of vaccination is valueless as a safeguard against small-pox, or that it is a measure fraught with such serious dangers that it must not be enforced. On the other hand, it is abundantly evident that the value of vaccination is recognised, and the moment there is the suspicion of danger, a scare of small-pox, the public rush to secure each for himself this valuable safeguard.

Evidences of the Efficiency of Vaccination afforded by the Australian Epidemics.

The following facts are taken from the text elsewhere in the book and grouped together here for the sake of convenience:—

Perth, 1893. Thirty-seven vaccinated, all mild attacks, none fatal; 13 unvaccinated, 9 died, the other 4 very seriously ill.

Newcastle, 1877. McGowan's child in close contact with patient until third day of rash and unvaccinated. It did not, however, contract the disease.

It clearly follows that it is not an absolute rule that an unvaccinated person will contract small-pox if exposed to infection.

Sydney, 1881-2. Of the total number of deaths in which vaccination or non-vaccination has been recorded, 25·0 per cent. occurred amongst vaccinated patients, and 72·5 per cent. amongst unvaccinated persons.

Several instances in which the protective power of vaccination is definitely shown are given on page 13.

Of the persons attacked by small-pox in this epidemic, about whose condition of vaccination there is any record, 45·6 per cent. had been vaccinated at various ages.

The table given on page 15 enables the following results to be computed:—

Persons never vaccinated	..	..	63·5 per cent. recovered.
			36·5 per cent. died.
Persons "vaccinated"	..	..	88·2 per cent. recovered.
			11·8 per cent. died.

Amongst those vaccinated persons who died there was none younger than seventeen years, and none had been vaccinated since infancy.

No person died who had been twice vaccinated.

Sydney, 1884-5. Of 17 patients who had been vaccinated in infancy, 4, or 23·5 per cent., had a severe attack; while 13, or 76·4 per cent., had a mild attack.

Of those 19 patients who had never been vaccinated, 13, or 68·4 per cent., had a severe attack; while 6, or 31·6 per cent., had a mild attack only.

It will be noticed that vaccination in infancy approximately reversed the percentages that were experienced amongst the unvaccinated.

Melbourne, 1857. The results in this epidemic expressed as percentages are as follow:—

			Died.		Severe.		Mild.
Unvaccinated	..	..	33·3	..	50	..	16·7
Vaccinated	..	..	22·2	..	33·3	..	44·4

Melbourne, 1868-9. The results in this epidemic may be expressed as follow:—

Of unvaccinated persons attacked, 66 per cent. died; of persons vaccinated in infancy, 12 per cent. died, 4 per cent. were severe, and 84 per cent. mild.

No re-vaccinated person was attacked.

The three fatal cases amongst those who had been vaccinated in infancy were aged 12, 21, and 23 years.

Melbourne, 1884-5. The facts given are not complete enough to justify any extensive deductions.

One case (*see p. 51*) is a striking example of the effect of vaccination during the incubation period in aborting the attack of small-pox.

Launceston, 1887. Persons who had been vaccinated in infancy, 10 per cent. died (one person only). Persons who had been vaccinated after childhood, none died. Persons who had never been vaccinated, 43 per cent. died. Persons who bore no marks of ever having been vaccinated, 100 per cent. died.

Or, to express the facts in another way:—Persons who had certainly been vaccinated, 7 per cent. died. Persons who actually or virtually were not vaccinated, 52 per cent. died.

In regard to the single case of death amongst the vaccinated patients, it should be mentioned that the man was otherwise unhealthy, and his vaccination dated back more than 40 years.

Of those persons definitely known to have been exposed to infection—

Of 25 people vaccinated in infancy, 10 developed the disease, being 40 per cent.

Of 20 people vaccinated in after life, none developed the disease.

Of 29 unvaccinated people, 23 developed the disease, being 79 per cent.

Launceston, 1903. No vaccinated person under 20 contracted the disease, while 28 unvaccinated persons under 20 did contract the disease, and 5 of them died.

Amongst the vaccinated patients of all ages, 16·6 per cent. died, while amongst the unvaccinated patients of all ages, 31·6 per cent. died.

Amongst those patients whose attacks were "severe," 76·5 per cent. were unvaccinated, while only 11·8 per cent. had been vaccinated, and in all of these the vaccination marks were "poor."

Amongst the "mild" cases, 75 per cent. had been vaccinated, while 25 per cent. were unvaccinated.

The facts given above justify the following statements as applying to the Australian experience of small-pox:—

1. An unvaccinated person when exposed to infection will not necessarily contract small-pox.
2. An unvaccinated person is distinctly more likely to contract small-pox when exposed to infection than a vaccinated.
3. Vaccination in infancy is not an absolute protection against small-pox throughout the whole of life.
4. It is, however, certain that vaccination in infancy gives the person who has contracted the disease a much better chance of recovery than the unvaccinated person has.
5. It is certain that the protection afforded by vaccination against small-pox gradually diminishes as the time since the operation was performed becomes longer.
6. It is equally certain that the repetition of the operation several years after the original operation gives a very marked degree of permanent protection against the disease.

HISTORY OF VACCINATION IN NEW SOUTH WALES.

Although New South Wales is the oldest and most densely populated of all the Australian States, and the one which has suffered most from small-pox, yet there has never been enacted any legislation dealing with vaccination or any organized scheme for ensuring a vaccinated condition of the community.

That "vaccine matter" was introduced into this Colony at an early date is very clear from the quotations supplied in Appendix D. These quotations are from an extremely interesting account given by Dr. G. L. Mullins in the *Australasian Medical Gazette*, during 1896-1897-1898. The claim of the medical man who introduced the "vaccine matter" into Western Australia, and who quoted the grant of land given to the man who was similarly successful in New South Wales (*see* p. 142) as a precedent in support of his own claim, is not supported by any of the extracts given.

According to the *Australian Medical Journal* (1846, p. 46), Dr. W. Dawson, the Principal Medical Officer at that time, urged upon the Colonial Secretary, in 1846, the necessity of appointing a young surgeon and equipping a Vaccine Institute so that vaccine lymph might be perpetuated. A sum of £380 was proposed to be set aside for this purpose, but an amendment that it be reduced to £100 was carried in the Legislative Council. It was argued by one of the members of the Legislative Council that "the reason that the Government was not called upon to provide such an institution in Scotland was that the people there were wiser, they were better educated, and it would be wiser here to devote the money to education, to teach people the value of such institutions, when they would provide them for themselves." Notwithstanding this contention the Institute was opened in 1847.

The first official reports now available relate only to the years subsequent to 1851, after which period annual reports on vaccination were furnished to the Government by the "Medical Adviser." At the beginning there was one public vaccinator and a Vaccination Institute in Bent-street, Sydney. At this period and for years afterwards, lymph was supplied to New Zealand, Norfolk Island, and various islands in the Pacific; and a supply was sent to King George's Sound in 1862. At a later period (1890) a reversal of these arrangements took place and the New South Wales Government was obtaining its supplies from New Zealand.

No compulsory Vaccination Act has ever been passed, although efforts have been made to secure the introduction of such. In the *Annual Report on Vaccination* for the year 1858, dated 10th March, 1859, it is stated that "a philanthropic wish has been expressed, and an attempt has been made, to introduce a Bill for compulsory vaccination." No further reference to this Bill could be found, and presumably it was not treated very seriously. Most probably it was based on the English Act of 1853.

A later attempt was made in 1869, when a message to Parliament by the Governor recommended the Legislative Assembly to make provision for rendering vaccination compulsory (22nd February, 1869). The details of this Bill, which was actually introduced into Parliament (*see Annual Report on Vaccination*, 1868) follow closely those of the Victorian Act of 1854, with the exception that vaccination was prescribed as compulsory within three months after birth, instead of six months, as was prescribed in the Victorian Act.

This Bill was taken into Committee and reported with amendments on 27th March, 1869. Thereafter no further action was taken.

That another attempt was made in 1877 to introduce a Bill appears from the following Petition :—

20th February, 1877.

The Petition of the undersigned Humbly Sheweth—

1. That Your petitioner sees with concern that it is proposed by a Member of the Council to introduce a measure to make vaccination compulsory.
2. That Your petitioner and several of his friends would rather suffer fine or imprisonment than suffer the introduction of human virus into their families.
3. That genuine vaccination by matter from the cow is considered by them preferable, and they would have it performed.
4. Therefore Your petitioner prays that, should such measure become law, those who vaccinate as above from the cow, may be protected from penalty, &c., &c.

During the epidemic of 1881 in Sydney, instructions were issued, at the suggestion of Dr. H. G. Alleyne—the Medical Adviser to the Government, that all inmates of Government Institutions, such as gaols, benevolent asylums, &c., should be vaccinated. This was done, and considerable agitation resulted from various reasons. As a result an exhaustive inquiry was held by Cabinet Ministers, sitting as a Committee of Inquiry. Many of the leading medical men in Sydney were examined, and the proceedings were published as a Parliamentary paper. There is no statement as to the conclusions arrived at by Cabinet, but it is certain that no Act of Parliament was passed by the Government. During the epidemic of 1881 also Cabinet sat for the greater part of a week in the capacity of a Committee of Inquiry, and verbally examined the principal medical men in Sydney as to their opinions upon the efficacy of vaccination.

That the neglect to provide the necessary legislative instrument was not the result of any negligence on the part of the medical advisers of the Government is shown by the fact that almost every one of the successive advisers repeatedly drew attention to this lack of the necessary power. The first of these warnings was uttered in the Vaccination Report for 1855, and they have been repeated at intervals ever since. One of these warnings is picturesque enough to repeat at length. (Appendix E.)

These warnings were, however, fruitless, for never has there been any Vaccination Act in New South Wales.

The lymph supply during later years was obtained regularly from England, being first drawn from this source in the later years in 1861. Some calf-lymph was obtained in 1882 from the Victorian Model Farm. No attempt appears to have been made to cultivate calf-lymph in New South Wales as late as 1895, as the remark appears in the *Annual Report on Vaccination* that “no lymph was cultivated in New South Wales.”

On 14th May, 1898, there was established a Pasteur Institute in Sydney, under the direction of Dr. Rongier. At this institute calf-vaccine was cultivated, but it is not known for how long this was continued.

HISTORY OF VACCINATION IN VICTORIA.

The first Victorian legislation dealing with vaccination was “An Act to make compulsory the Practice of Vaccination,” which was passed in 1854. This Act was repealed by the Public Health Act of 1865 in which the provisions of the 1854 Vaccination Act were re-embodyed. The Act required the vaccination of every infant within six months after its birth.

The part of the *Health Act* 1865 (Part V.) dealing with vaccination was repealed by and replaced by a new *Vaccination Act* 1874.

Sections 24 and 25 of this 1874 Vaccination Act were amended by the Public Health Act of 1889, and the remainder was repealed by and the Public Health Act of 1889, replaced by the Consolidated Health Act of 1890, Part IX. of which deals with vaccination. One section of this division dealing with vaccination (section 202) was amended by Act No. 2411.

The existing Vaccination Statute, therefore, is the Health Act of 1890, which prescribes vaccination for every infant within six months after birth.

Vaccination in Victoria was at first performed with lymph obtained from England and maintained by transmission from arm to arm, vaccination with calf lymph having been very rarely practised before 1880.

Although the Vaccination Act of 1854 required vaccination, yet no administrative arrangement was made for the supervision of vaccination. The lymph was kept in the office of the Registrar-General, who supplied it to medical practitioners on application—no check on its purity or test of its activity being made. (*Australian Medical Journal*, 1857, 147.) Public vaccinators were appointed throughout the State, but the policy of appointing unqualified public vaccinators in some districts was adopted, and led to considerable agitation by the profession.—(*Australian Medical Journal*, 1865, 25.)

In 1872 considerable discussion occurred as to the relative merits of vaccination with calf lymph or human lymph. The *Australian Medical Journal* in its leading article for July, 1872 (p. 222), expresses the following ridicule of vaccination with calf vaccine :—

As a matter of course, one or two of those ill-informed persons, who, the less they know about a matter the more they have to say upon it, have availed themselves of the opportunity to thrust themselves into prominence by demanding that vaccine shall be obtained direct from the cow; and insisting that humanized lymph has no prophylactic efficacy. For such persons, pathological knowledge progresses in vain; but as Dr. Seaton and other scientific investigators will be preferred to these quid-nuncs, they may be left to the airing of their folly without any risk to the community, or any other notice from the scientific section of the profession than a contemptuous indifference.

In the same year Dr. Patterson, of Adelaide, remarked as follows :—
“Heifer vaccination can never supplant arm to arm vaccination” (i.e., p. 311).

In the year 1882 a committee appointed by the South Australian Branch of the British Medical Association reported as follows :—

Your Committee is disposed to think that a more certain immunity may, on the ground of common-sense, be expected to be devised from a lymph which has not for generations been propagated on a soil to which it is not native.—(*Australasian Medical Gazette*.)

This question excited a great deal of discussion, and in 1881 a Select Committee of the Legislative Assembly was appointed. This Committee reported that there was disagreement amongst the witnesses as to the danger of arm-to-arm vaccination, and the Committee accordingly recommended “that a Bill be brought in to amend the present Vaccination Act, in order to have depôts established for supplying animal lymph from young heifers.”

At some time prior to June, 1883, there had been established a vaccine Depôt at Royal Park for the production of calf vaccine. Dr. Le Fevre was in charge of this institution until 17th April, after which date the preparation

of vaccine lymph and the vaccination of children was carried on by Mr. Graham Mitchell, a veterinary surgeon.—(*Australian Medical Journal*, 1883, 285.)

It is worthy of note that, prior to the establishment of this official farm, Dr. O. Penfold had successfully vaccinated calves with seed obtained from England, and had successfully vaccinated more than 100 children direct from these calves.—(*Australian Medical Journal*, 1883, 381.)

Dr. Penfold also a later date (1885) sent regular supplies to the Tasmanian Government.—(*Annual Report on Vaccination*, Tasmania, 1885.)

In September, 1883, the Central Board of Health assumed control of the Dépôt, and Dr. Talbot was placed in charge (*Australian Medical Journal*, 1883, 427), Mr. Graham Mitchell being retained to carry out the actual vaccination of the calves. Early in 1884 it was found that Mr. Mitchell had some disagreement with the Board and it was decided to supersede him.—(*Australian Medical Journal*, 1894, 96.) After Mr. Mitchell's departure Mr. Kendall, another veterinary surgeon, was appointed, and Dr. Fletcher was placed in charge of the vaccination of children.—(*Australian Medical Journal*, 1884, 191.) Other changes were made until in 1887 Dr. J. T. Brett was placed in charge of the Dépôt, and he was still in that position until the close of the period covered in this volume.

This Dépôt has been the one permanent dépôt for the preparation of vaccine lymph in Australia, and it has supplied the various States with such vaccine lymph as they require.

The Victorian Government in 1884 proposed to the various local authorities in the State that each should establish its own vaccine dépôt, but this proposition was not favourably received, and no practical result eventuated.

Numerous attempts have been made to secure an amendment of the compulsory vaccination provisions of the various Acts which have from time to time prescribed the statutory obligation. Bills with this object were introduced before Parliament in 1856, 1884, 1895, 1896, 1897, 1898, 1899, 1900, 1901, and practically every session of the Victorian Parliament since then. The amendment of 1884 had as its object the optional use by the person to be vaccinated of calf vaccine or human vaccine. Each of the other amendments had as its object the abolition of the obligation in respect of vaccination, making vaccination purely voluntary. None of these amendments became law, but the use of calf vaccine, although not recognised by any Statute, is now general.

HISTORY OF VACCINATION IN QUEENSLAND.

In several places occurs the statement that New South Wales is the only State in which there is no Vaccination Act (Annual Reports on Vaccination, 1882, 1892, Memorandum by the New South Wales Board of Health on Vaccination 1889, and Report of Australasian Sanitary Conference, 1884). This cannot be true, for there is no evidence that there has ever been any Vaccination Act in Queensland. That there have been attempts at times in this direction is indicated by certain references. For example, the Queensland Central Board of Health, in a progress report, issued in 1877, drew the attention of the Government to the fact that there was no protection in Queensland against small-pox, and made certain recommendations. As

a result of these the Government appointed public vaccinator at Cooktown, Townsville, Bowen, and Rockhampton, and an abundant supply of lymph was obtained from Melbourne. As a result of these measures the Board reported "we are happy to say that vaccination is being very widely carried out."

There is no record of the number of vaccinations performed, nor any other authoritative statement upon the subject. So far as could be ascertained, there has never been any other attempt to introduce measures of vaccination in Queensland, until the Health Act of 1900, which contains certain provisions. These provisions have not, however, been yet actively applied.

For a brief period vaccine lymph was cultivated on calves in Brisbane during the year 1892, several calves having been inoculated by Dr. Hirschfeld, Honorary Bacteriologist to the Brisbane Hospital. The Government of the day, however, did not continue with this work and it lapsed.

HISTORY OF VACCINATION IN TASMANIA.

The first account of vaccination in Tasmania refers to the year 1818. The following is an extract from a despatch sent by Lieut. Governor Sorell, Hobart Town, on 23rd February, 1818, to Governor Macquarie, Sydney:—

Mr. Loane, who arrived here in the *Derwent* schooner from Calcutta, *via* Mauritius, on the 12th January, brought a box of vaccine matter, addressed to Your Excellency, from the Isle of France. There being at that time no prospect of an opportunity to go to Sydney, I judged it best to have the box opened and the matter tried here, so that, if good, its propagation might be ensured. I am happy to state that Mr. Assistant Surgeon Hood has had several successful cases, and I had intended to place in Mr. Broughton's charge a box, addressed to Your Excellency, of French (? fresh) matter collected here, when I learned by the Duke of Wellington that the vaccine matter was now secured at Sydney. I trust it will be preserved here.*

1821. The next reference is in *Bent's Tasmanian Almanack*, 1829, p. 98. as follows:—

8th December, 1821. Vaccination for the small-pox resorted to in the colony, by Dr. James Scott, R.N.

1822. The Colonial Surgeon having now fully established the cow-pox in this place, again begs to remind the inhabitants of Hobart Town and the public that, notwithstanding the happy escape these colonies have had from the dreadful ravages of the small-pox, the most loathsome of all diseases, we know not how soon our boasting may be changed into mourning by its introduction; and, while in our power to secure to ourselves a safeguard against such a scourge to the human race, it cannot be too strongly impressed on the minds of parents the inconceivable blessing they are capable of bestowing on society by having their children inoculated for the cow-pox, which they may get performed at His Majesty's Colonial Hospital on every week-day, between the hours of 11 and 12 in the forenoon, or at their houses, on giving one day's previous notice.

The medical gentlemen of the colony may be furnished with the vaccine virus on application at the Colonial Hospital.

(Signed)

J. SCOTT, R.N.,
Colonial Surgeon.

—*Hobart Town Gazette*, 9th March, 1822.

1828. The *Colonial Advocate* of 1st September, 1828 (p. 342-3) referring to the arrival in Sydney of the infected ship *Bussorah Merchant*, says—

Now the small-pox is come. We scarcely think it necessary, from the alarm which has penetrated every parent's bosom, to advise those of our fellow colonists, who are favoured with such interesting pledges, to lose no time in getting them inoculated, though we are sorry to be informed, at this eventful crisis, there is no vaccine virus in the colony. We trust that this will turn out not to be the fact. . . .

Then there is a footnote as follows:—

We have much pleasure in stating since this article was written, it comes to our knowledge that Dr. Gibson has inoculated three or four children within the last three

* From copy in Library of Royal Society of Tasmania.

four days, and if success should attend the doctor's attempts there will be no want of the antidote to small-pox.

The *Colonial Advocate* of 1st October, 1828 (p. 383), published in Hobart, states that—

One hundred and seventy children belonging to the garrison were, it is said, brought to the General Hospital in Macquarie-street, a few mornings back, for the purpose of being inoculated with the cow-pock.

The Vaccination Act at present in force in Tasmania, is *The Vaccination Act* 1898, which repealed the Vaccination Act of 1882. It provides for compulsory vaccination of all infants within twelve months after birth.

The first Vaccination Act in Tasmania was passed in 1854.† This was repealed by the Act of 1881 (No. 2), which provided that "every person above the age of fourteen years, not successfully vaccinated before the commencement of this Act, shall submit himself for vaccination within two months"; that "the parent of every child less than fourteen years old, not successfully vaccinated before the commencement of this Act, shall submit such child for vaccination within two months"; and that "the parent of every child born in Tasmania after the commencement of this Act shall cause it to be vaccinated within two months of birth."

The next Act was passed in 1882 (No. 19), which increased the periods above from two months to six months. The next Act (the existing Act) passed in 1898, increased the periods from six months to twelve.

In the 1881 and 1882 Acts a penalty of £1 is provided for any person who prevents any medical practitioner from taking lymph *once* from any child whom he has vaccinated.

1868-1877. In one of the early Tasmanian reports it is stated—"From 1868-1877 vaccination was entirely suspended in this State, and it was re-introduced in the latter year because of the outbreak in Sydney at that time."

In 1869, Dr. E. Swarbreck Hall petitioned the Legislative Council, asking that vaccination be generally enforced (*Australian Medical Journal*, 1869, p. 323).

Prior to that date, a Select Committee of the Tasmanian Parliament had been appointed (in 1863) "to consider the Vaccination Bill which had been introduced that session." This committee, after examining several medical witnesses, reported as follows:—

First: that the present law relating to vaccination is altogether unsatisfactory, useless, and inoperative.

Secondly: that there exists a large and most dangerous proportion of the children in the colony unprotected by vaccination.

And thirdly: that no measure short of house to house visitation can effectually secure the community from the possible ravages of one of the most loathsome and fatal diseases to which the human race is liable.

Evidently another Bill was introduced before the House of Assembly in 1873, as a petition signed by six medical men was presented, objecting to certain of its provisions.

In 1881 the Colonial Secretary addressed to each of the medical men in Tasmania a series of questions concerning vaccination, the replies to which were printed as a Parliamentary Paper.

†An amending Bill was introduced in 1863, but did not become law.

In 1887 a supply of lymph was sent from Victoria to Tasmania.—(*Australasian Medical Gazette*, 1887, p. 24.)

The *Australasian Medical Gazette* (1897, p. 357) states that "for the past seven years the compulsory clause of the Vaccination Act has been in abeyance."

The Central Board of Health of Tasmania reported that the Government refused to find any money for the administration of the Vaccination Act, and, consequently, the Act could not be enforced.—(*Australasian Medical Gazette*, 1899, pp. 257 and 360.)

In the Bill for the present Public Health Act (1903), as originally presented, there were sections providing for compulsory vaccination, but these sections were withdrawn.

HISTORY OF VACCINATION IN WESTERN AUSTRALIA.

The first attempt in Western Australia to obtain any definite legislative powers in the matter of vaccination was in the year 1860, when an Ordinance was passed entitled "An Ordinance to make compulsory the practice of Vaccination." It provided for the establishment of a Vaccine Board which should have the administration of the Ordinance and should be responsible for the maintenance of a sufficient supply of vaccine matter. This vaccine matter was to be furnished to the District Vaccinators without charge. District Vaccinators were to be appointed who were to vaccinate every child brought to them. There was no provision for charging the parents for vaccination, but the Treasurer was to pay the sum of 3s. 6d. for each successful vaccination.

Each child residing within 10 miles of a district vaccinator had to be vaccinated within three months, and if it resided outside the 10-mile radius it had to be vaccinated within six months.

Inoculation with small-pox virus was expressly prohibited under a penalty, for a qualified medical man, of £20; and for an unqualified inoculator, of six months' imprisonment.

The section in which it is provided that the Central Vaccine Board should maintain a supply of vaccine matter was well warranted, for there is occasional reference to the question of the difficulty of keeping a supply of vaccine.

On 23rd March, 1840, James Crichton, the Colonial Surgeon of that period, memorialized the Secretary of State for the Colonies for a grant of land of the maximum area, in consideration of his having successfully introduced vaccine material into the Colony. In support of this application he quoted the case of the medical man who introduced vaccine material into Sydney, and who therefor was granted a tract of land.

The next reference to the matter is in the year 1854, when the Colonial Surgeon forwarded a minute to the Colonial Secretary on 17th October, as follows:—

Sir,

The vaccine matter having been lost in the Colony, I beg to represent the urgent necessity for requesting the Adelaide Government to supply some as soon as possible.

Whether the vaccine matter had been maintained between the years 1840 and 1854 there is no record, but that there was a difficulty very soon

after the communication last quoted is evidenced by the fact that in 1858 the Colonial Surgeon again found it necessary to write to his Minister as follows :—

7th March, 1858. As there are very many children in this Colony who have not yet been vaccinated, I have the honor to request that the South Australian Government be applied to, to forward a supply of good cow-pox virus at their earliest convenience. As it is necessary that the virus should be carefully put up, I beg respectfully to request that instructions should be forwarded to put it into carefully sealed tubes, if this be practicable.

JOHN FERGUSON.

In 1861 the Colonial Surgeon again writes to his Minister :—

18th February, 1861. Recommending that a monthly supply of lymph be got from England and also immediate supply from Victoria and South Australia.

After the introduction of the Ordinance of 1860 and the constitution of the Central Vaccine Board, there is little evidence of any increased activity in the matter of vaccination. Certainly, the Central Vaccine Board found it necessary to approach the Minister some eight months after its inauguration for a set of pigeon holes. The minute is as follows :—

29th August, 1861. We have the honour to request that you may be pleased to obtain His Excellency the Governor's approbation that a small press containing a few pigeon holes for official purposes may be immediately made by some carpenter. The Central Vaccine Board are much in want of this article to keep therein all the monthly returns which are now furnished by the several district vaccinators.

There is here an indication that some monthly returns were being furnished in accord with the provisions of the Ordinance, but there is no indication that the practice of vaccination was in any way extensive. On the other hand, the fact that it was not so is indicated by several minutes on the subject forwarded by the Central Board :—

At its meeting on 31st January, 1874, a letter from the Colonial Secretary was received in which the latter asked for recommendations as to any way in which the "Ordinance for making vaccination compulsory could be better carried out than hitherto."

The Board made various suggestions which were referred by the Minister back to the Board with the query as follows :—

These provisions seem unobjectionable, nay absolutely necessary, to insure the completeness of such a measure as general vaccination, subject, however, to this remark : The Colony is sparsely peopled, and on long lines of road on vast areas of country. Doctors are very rare. Will not mere distance be almost an insuperable obstacle ? The enactment will apply to every district in the Colony, to the North and East Districts, to the De Grey and Eucla. How can it be enforced ?

On 24th March, 1874, the Board again met to consider this objection and their answer was that the Act would only be enforced in the centres of population.

Nothing was done, however, and again, on 14th July, 1876, the Board submitted another set of recommendations, the principal one of which was that where there was any population at a greater distance from a Public Vaccinator than 20 miles, that the Public Vaccinator should be obliged to visit such districts once yearly, a suggestion which was incorporated in the Act which was passed in 1878.

It is worth while recording the names of this Vaccine Board. They were as follow :—Dr. A. R. Waylen, Dr. G. C. Attfield, Dr. Tudor Hora.

The next step in the development of the question was the appearance of the Annual Report of the Colonial Surgeon for the year 1876 (published 1st March, 1877), in which the following remarks appear :—

The returns of successful cases of vaccination do not compare favourably with those for the year 1875 ; these number 718 for the past year, or 200 less than the number of

births; and of these many are cases of re-vaccination amongst white persons and aborigines, so that allowing for these, I consider that fully one-third of the infants born last year are unprotected from small-pox. The law with regard to vaccination may be considered a dead letter, and appears likely to remain so, until means are taken to give effect to the compulsory clauses of the Act.

On the 30th July, 1877, the Colonial Secretary was asked in Parliament whether, in view of the remarks of the Colonial Surgeon (just quoted), the Government proposed to introduce any fresh legislation or to take any steps to make the vaccination laws more definitely operative. The Minister replied that it was not the intention of the Government to introduce any fresh legislation.

Notwithstanding this answer, the Vaccination Act of 1878 became law the next session, and is still the principal Act in force in Western Australia. The text of this Act is given as an Appendix, and it will be seen that it is merely an extension of the previous Ordinance. The Central Vaccine Board was replaced by a Superintendent of Vaccination, and the inoculation of small-pox virus was forbidden. The difficulty of the distances and scattered nature of the population was dealt with by the creation of districts; the residence of the public vaccinator is taken as the centre, and the district within a radius of 5 miles was to be declared an "urban district," and within 20 miles, a "suburban district." All children born within an urban district were to be vaccinated within three months, and any child born within a suburban district had to be brought up for vaccination within six months. All other districts were to be served by the appointment of a travelling vaccinator.

Immediately after the passing of the Act, viz., in 1879, there were gazetted fourteen districts (a fifteenth was added in 1887), and these fifteen districts were all that were gazetted from that time until 1909, when the administration of the Act was revised and the details brought up to date. The population had multiplied itself by nearly ten times in the period between 1879 and 1909, and the districts—still in force in 1909—included only a very small fraction of the births, the result being that a large proportion of the Western Australian population must be considered as unvaccinated.

The following is a copy of the *Gazette* notice in which the original proclamations of the districts was included:—

1879. In accordance with the provisions of 42 Vic. 13 Cl. 5, the Urban Districts for the purposes of the *Vaccination Act* 1878, are declared by the Governor in Council to be within a radius of 5 miles, and the Suburban Districts within a radius of 20 miles from the places of residence of the public vaccinators appointed by notice in the *Government Gazette* of this date. The said districts are shown on a map lodged in the office of the Colonial Secretary, a copy of which can also be seen at the residence of each public vaccinator. It will be seen that where the radii intersect the boundary is a straight line drawn between the points of intersection, and that the Suburban District of Perth, Fremantle, and Guildford are defined by a single boundary line coloured green."

It is interesting to notice that in 1884 there was published in the *Government Gazette* some correspondence from which it appears that a sum of £200 was placed on the Estimates for the vaccination of the wild aborigines in the North-west. The Minister expressed some apprehension about the difficulty of catching them for the purpose, but it was arranged to furnish settlers with lymph on being satisfied that they knew how to use it. There is no further reference to this £200, and considering that many of the natives

in this district were, 20 years later, still killing white residents, it is very doubtful whether any of the money was expended.

There is no information as to the source of lymph supply until after 1900, when it was always obtained from the Hawkes Bay Depôt, in New Zealand.

In 1911, when the Health Bill was under consideration in the Legislative Assembly, a private member succeeded in obtaining the insertion of a new clause dealing with vaccination. It was in effect a "conscience clause" to permit any person, who has conscientious objections to the practice of vaccination, to escape any penalty for the non-performance of his obligations in this regard. It is as follows :—

No parent or other person shall be liable to conviction or to any penalty for neglecting or refusing to have any child vaccinated or to take any child or to cause any child to be taken to be vaccinated as a protection against any infectious disease, if, within four months from the birth of the child, he makes a statutory declaration that he conscientiously believes that vaccination would be prejudicial to the health of the child, and within seven days thereafter delivers the declaration to the District Registrar of Births and Deaths in the Registry District within the birth of such child was registered.

HISTORY OF VACCINATION IN SOUTH AUSTRALIA.

The first Vaccination Act in South Australia was passed in 1853 (Act No. 16 of 1853). This was amended the following year (Act No. 15 of 1854) and again amended in 1872 (Act No. 21 of 1872). The Vaccine Board constituted by the earlier Act was evidently not very active, for during the years 1867–1871 inclusive it met only 23 times. All of these Statutes were repealed by the Compulsory Vaccination Act of 1882 (No. 248).

This Act was very similar in its provisions to the Vaccination Acts in force in other States about that period, provision being made for the division of the State into districts. Vaccination was made compulsory for every child within six months after birth with the usual provision for unfitness or insusceptibility. The police were empowered to take action in the event of a breach of the Act. The vaccination officer was obliged to keep both animal and humanized lymph in stock, and inoculation with variolous matter was prohibited.

This Act also contained provision for the reporting of cases of small-pox to the Board of Health. In section 6 also power is given to the Governor for the control of small-pox. The section reads as follows :—

On the breaking out of small-pox in the province, the Governor may, by proclamation in the *Government Gazette*, declare the province infected by small-pox, and may thereupon make such additional regulations as may be necessary for the safety of the public.

A section providing for the vaccination of persons on board of a vessel arriving with small-pox was also contained in the Act.

The next Act was passed in 1892 (No. 554), and aimed at giving the parent the option of having humanized or calf lymph used for the operation according to his wishes. Every parent was entitled, upon giving notice by registered letter, addressed to the Vaccination Officer, Adelaide, within six months after the birth of any child, to require that the vaccination shall be performed with calf lymph, and was required in such notice to state the name and address of the medical practitioner or public vaccinator by whom he desired his child to be vaccinated. The Vaccination Officer was required, upon receipt of this letter, to send calf lymph to the medical man and to notify

to the parent that the calf lymph had been so sent. If the parent attended at the place appointed within six days after the date upon which the Vaccination Officer had posted his letter then he was exempted from prosecution.

The parent of any child was given the right to enquire of the medical man about to vaccinate his child whether calf vaccine or humanized lymph was being used; and the medical man was required to answer accordingly.

In 1900 a petition was presented to the House of Assembly, bearing 1,149 signatures, stating that "the present Act enforcing compulsory vaccination is unnecessary and objectionable on many grounds," and praying that the House would amend the Act.

The next Act was passed in 1901 (No. 761) and was called "An Act to Abolish Compulsory Vaccination."

This Act declared that any parent would be exempted from penalty provided that he made a declaration to the effect that he conscientiously believed that vaccination would be prejudicial to the health of the child within six months after its birth, and provided that, within seven days after the making of the declaration, this declaration was delivered to the Vaccination Officer. A proviso was, however, made so that the occurrence of small-pox in the State might be provided for. Power was given to the Governor to render the above provisions inoperative in the event of small-pox appearing in any State either in the whole or any part of the State, and also to order persons who have been contacts with a case of small-pox to be vaccinated or revaccinated within a specified time.

This Act was to continue in force until 30th June, 1906.

This Act was extended in the time of its operation until 30th June, 1911, by The Abolition of Compulsory Vaccination Extension Act of 1906 (No. 908). The 1901 Act was also amended by striking out the necessity for registering the letters, and permitting the declaration to be made within twelve months after the birth of the child.

In addition to these provisions it was provided that where the expression "calf lymph" was used in preceding Acts it was to be taken to mean that "such lymph so used shall, where practicable, be glycerinated."

The next Act (No. 919 of 1907), "The Compulsory Vaccination Exemption Extension Act," provided that any person might before the end of 1907 declare his conscientious objection in respect of any child born before passing of the Act.

The last Act was passed in 1911 (No. 1036). This Act extends the operation of the 1906 Act until 30th June, 1916, and provides that no parent shall be liable to a penalty in respect of any child born before the passing of this Act, if before the passing of this Act he has made, or if within twelve months after the birth of such child or within three months after the passing of this Act, whichever is the latest time, he makes a declaration of his conscientious objection, and within seven days has delivered the same to the Vaccination Officer.

The principal provisions existing at the present time therefore are that a parent may obviate the vaccination of his child by lodging a declaration of conscientious objection within twelve months of the birth of the child, and that the Governor may, on the appearance of small-pox within the State, require the vaccination of contacts.

APPENDICES.

APPENDIX A.

VARIOUS REFERENCES TO SMALL-POX AMONGST THE ABORIGINES.

In a leading article in the *Sydney Gazette*, of 14th September, 1830, appears the following :—

“The horrible havoc made among the natives by the small-pox shortly before the foundation of the Colony.”

The following is a hitherto unpublished reference to the epidemic of small-pox amongst the aborigines near Sydney in 1789. This extract is taken from a diary kept by a Sergeant of Marines (?) now in possession of Mr. W. Dixon, of Sydney, to whose courtesy I am indebted for permission to use the extract.

“Wednesday, 15 April, 1789. I went with a party to cut grass tree for L. Johnstone, found three Natives under A Rock vis a Man and two Boys (of which one Boy was Dead) the Governor being Acquainted with it Ordered the man and Boy to the Hospital under Care of the Surgion the having the Smallpox. the Man Died ye next day the Boy Continues to get Better.”

Phillip, in a letter to Lord Sydney (1790), said he had been unable to determine whether small-pox was a disease to which the natives were subject before any Europeans visited the country or whether it was brought by the French ships in 1788. It never appeared on board of any of the English ships during their passage, nor in the settlement, until several of the natives had been seen dead with the disorder in various parts of the harbor, and the blacks above referred to had been brought into the hospital. It is estimated that one-half of those inhabiting the district died during this epidemic.—*Historical Records of New South Wales*, Vol. I., Pt. 2, p. 299.

Dr. John Fraser quotes a friend as saying “When I arrived at Dungog, in 1840, I observed several oldish men deeply marked with traces of small-pox, and on questioning them, I found that when they were young a fearful epidemic of this complaint had raged in the district and carried off great numbers of the aboriginal population. I was informed that, when the disease first appeared, they were camped at a place now called by the whites “Black Camp Creek.” Here the disease was of a very virulent type, and, after a week or so, they were unable to bury their dead, and day by day kept moving onwards, leaving their dead on the ground. Before this the district was populous, but after it the blacks never recovered their numerical strength.—Fraser, *The Aborigines of New South Wales*, 1892, p. 62.

The following extract from the *Australasian Medical Gazette* is of interest—(*Australasian Medical Gazette*, 1882, p. 110) :—

“At the last meeting of the Royal Society (South Australia), Prof. Tate stated that, during his visit to the Northern Territory, he was shown several plants used by the natives as a remedy for small-pox, but as the disease has not prevailed since the occupation of the territory by the present white population, there was no means of ascertaining the reputed virtue of the plants.

The Secretary mentioned that in South Australia the natives were much pitted with marks which he attributed to a visitation just previous to the advent of white men.”

A paper was read before the Medical Society of Victoria on 10th February, 1869, by Dr. Thomas on “Variola and Varicella,” from which the following extract is taken—(*Australian Medical Journal*, February, 1869, p. 47) :—

“It must not be supposed that variola has only of late made its first visit to this Colony. When I arrived here, in the beginning of 1839, I saw several blackfellows of the Yarra, Goulburn, Geelong, and other tribes, all of them rather advanced in years, having the pits of small-pox. The only answer they could give to my queries as to where and how they got it was ‘Big long time Dibble Dibble come, plenty kill him black fellow.’ There is no doubt that it had been introduced long before and extended over various

parts of the country. In speaking of this subject to a friend of mine, nearly as old a colonist as myself, he mentioned several cases which came within his knowledge. He wrote to me at my request a short account, which I shall have pleasure in reading :—

My dear Thomas,—I think it will interest you to know that I observed among the aborigines on the Yarra, about twenty-nine years ago, one or two individuals deeply pitted with the small-pox. I have also seen traces of the same disease among the blacks at Port Lincoln, in South Australia, as well as among the Loddon and Lower Murray tribes. In every case the person so marked appeared to be upwards of fifty years of age. When Governor Phillips arrived with the first importation of convicts at Botany Bay, natives were found among the caves and rocks dying from small-pox. You will find this mentioned in the journal written by my uncle, Admiral Hunter. I have a negative of a Loddon black, whose face was covered with pock marks, but regret that I have not time to give you a print of it.”

I remain yours truly,

JOHN HUNTER KERR.

In the *New South Wales Medical Gazette*, 1871-2, p. 340, in an Editorial, after discussing Dr. Mair's report (which is quoted elsewhere), the following remarks appear :—

“We recollect hearing when a boy that the southern shore of Botany Bay and the shores of Port Hacking were strewn with the bones of aboriginal natives, who had succumbed under a similar visitation. Remains of hundreds of aboriginal natives have been discovered by a flooding of a portion of the River Murray who were supposed to have died many years ago under a like epidemic.”

NEW SOUTH WALES MEDICAL GAZETTE, 1874-5, PAGE 26.—ORIGINAL CORRESPONDENCE.
—VARIOLA AND VARICELLA.

To the Editor of the New South Wales Medical Gazette.

Sir,—The question of “Variola *v.* Varicella” having formed the subject matter of considerable controversy in your pages of late, I think it may be interesting to your readers to peruse the accompanying letter, which is the copy of a report furnished by the late Dr. George Busby, of Bathurst, to the Inspector of Colonial Hospitals, at Sydney, respecting an eruptive disease raging among the aboriginal population in 1831.

Dr. Busby was at that time on the Civil Medical Staff of the colony, and his letter (which was given to me after his decease, more than three years ago since) is now a valuable record of colonial disease in the newly settled districts of New South Wales almost half a century ago.

The report, which is most carefully prepared, will throw some light on the supposed small-pox of the blacks. It is interesting to the profession as a matter of medical history; and to his personal friends, will recall recollections of a painstaking and earnest worker in the fields of medical life, who now “rests from his labour.”

I am, Sir,

Yours faithfully,

(Sgd.) COSBY W. MORGAN.

Bathurst, 26th September, 1874.

Bathurst, 19th October, 1831.

Sir,—In reply to your letter of the 3rd current (which reached me only on the 12th), requesting me to furnish you with such particulars of the eruptive disease, supposed to be small-pox, raging among the black natives of the Bathurst district, as I might be enabled to obtain, I have now the honour to transmit for your information a detailed report of the case of Edward Titman, treated in the hospital at this place in August last, as a case of Varicella.

On the admission of this patient an eruptive disease was not anticipated, and it was not till the second day of the eruption, when the vesicles appeared, that the symptoms on the first three days were noted. The symptoms on each of the following days were taken down regularly.

Titman was exposed to the contagion of the disease lately prevalent among the aborigines in this district by living in the same house with a native labouring under it, and who, when convalescent, but still in a state of debility, retired from the house into

the neighbouring bush, and was found dead two days afterwards, from the effects, as was supposed, of the severe cold of the nights at the time he thus exposed himself. There were also other blacks with the disease upon them about the house at the same time. The symptoms and appearances in Titman's case corresponded, as far as I could judge, from the descriptions of unprofessional observers, with the disease affecting the blacks, as described to me by different individuals who had had opportunities of witnessing and observing it. He was also seen by several persons who had examined the disease among the blacks, and they regarded it as the same. One gentleman, who resides on the Laehlan, where the disease raged to a very destructive extent, pronounced the appearances to be the same as occurred in the blacks. He also informed me that he had seen upwards of 50 cases of the disease, and among these there was not one of greater, and not more than four or five of equal severity. There can, therefore, scarcely be a doubt of the identity of Titman's disease and that of the black natives.

The accession of the disease, as it occurs among the natives is, as I have been informed, marked by a fever varying in duration in different cases. In one case of a severe character the patient complained for eight days before the eruption made its appearance, but in the milder cases it appears on the second or third day. During this period they appear listless and drowsy, and complain chiefly of headache. Their skin is hot, their pulse high, and they are generally to be found near their fires. In the severe, as well as in the mild forms of the disease, the symptoms are much mitigated when the eruption comes out. This appears in the form of small pimples, which on the second or third day become vesicles and contain a colourless transparent fluid. These vesicles are from four to six days in acquiring their full size, when they are of the size of small peas. As the vesicle advances to maturity, and before the scabbing commences, the fluid changes its appearance, and has been described as resembling milk in consistence and colour, with a slight yellowish tinge. It has also been compared to rich milk, with a bluish tint. Some of the vesicles, and especially those on the hands and feet, are observed to obtain a bloody serum. These vesicles in most cases are few in number. In a few instances they are so numerous as in some places, and especially on the upper lip and also on the nose, to become confluent; and it is almost exclusively on these parts that small pits are observed after the severer forms of the disease. As the vesicles advance, the features swell in proportion to the number of these. In the worst cases, the eyelids are seldom more than half closed. I have conversed with no one who has seen them wholly closed, but I have heard of one instance in which even the sight was totally lost. The tongue swells much, and vesicles of a bluish colour appear upon it. There is no ptyalism. At this period there is also a soreness of the throat and some difficulty of swallowing. When the scabbing commences there is, in the severe cases, what is called a second attack (an exacerbation of the symptoms, which may be regarded as a secondary fever); and it has been remarked that when the disease has proved fatal it has been at this time, and that those who have not this second attack uniformly recover. In the milder attacks of the disease, the patients are indolent during the eruptive fever, but they continue to move about after the eruption has appeared. Many of those who are more severely affected, and especially if females, are carried about from place to place by those who are in health; and there is reason to fear that many unfortunate individuals who have been unable to walk, and who have been carried about by their friends as long as they were able to carry them, have afterwards been left behind and have perished from want of food and attention. It is the concurrent testimony of all who have had opportunities of affording them assistance, that in every case, even of the worst kind, in which a little salts were administered, and a little food, such as tea or milk, supplied them, with protection from the inclemency of the weather, they have, without exception, recovered. And I have heard of more instances than one where, after a little care of this kind, the patient was recovering, and from an anxiety to resume his rambling habits, has joined his tribe and fallen a victim to premature exposure.

I have myself seen only two blacks labouring under the disease, and both of them at a stage when no opinion could be formed of its nature; and I do not consider that the descriptions of persons unaccustomed to discriminate diseases of this kind, with one solitary example of the disease, and that occurring in a white person, afford sufficient ground on which to form a decided opinion.

In Titman's case, I conceive that the nature of the indisposition preceeding the eruption, the early appearance of the vesicles, the speedy arrival of these at maturity and the nature of the fluid, militate against the supposition of the disease being small-pox; while the resemblance to varicella in these particulars will, I think, be admitted. Another argument against this supposition is afforded by the fact that Titman had already passed through small-pox when young, and ought to have been exempt from a second attack of the disease. He was one of a family of six who had small-pox nearly about the same time, two of whom were so severely affected as to be blind for eight days, and were afterwards deeply pitted.

From this case, and such information as I think I can rely upon, and also from the general mildness of the disease, even in its worst forms, when the patients have received attention, I am, upon the whole, at present disposed to regard the eruptive disease lately prevalent among the black natives in this district as varicella, manifesting itself in a more aggravated form than it is known usually to assume, but possessing by no means a malignant character, nor likely, under ordinary circumstances of comfort and attention attainable in civilized society, to prove fatal in more than a few instances; the mortality it has occasioned among the blacks being sufficiently accounted for by the unfavorable circumstances in which they are placed.

It would be difficult, if not altogether impossible, to ascertain the origin of the disease, or to trace the quarter from whence it came. The blacks at Wellington Valley spoke of it a considerable time before it actually arrived, and regarded its approach with dread. From this place it appears to have passed through every tribe in the district, and, according to the account of one black, has taken the direction of the Murrumbidgee, where it is now committing its ravages. No case has occurred at Wellington Valley for the last nine months, and none at the Lachlan for the last two months; and I have not been able to hear of it existing in any other part of the country for several weeks past. Indeed, I think I may safely affirm that a case of the disease is not at this moment to be found in the district.

I have the honour to be, Sir,

Your most obedient servant,

(Sgd.)

GEO. BUSBY.

The Inspector of Colonial Hospitals, Sydney.

Flanagan says that "Towards the close of the year (1831) a cutaneous disease, similar to the small-pox, was prevalent among the aborigines in the northern parts of the colony. In October, a runaway prisoner of the Crown, from Moreton Bay, was brought by some blacks to Port Macquarie, and there delivered up to the authorities, a species of voluntary service which the aborigines frequently performed for the Government, influenced probably, by the feeling that to get rid of such persons was also a service rendered to their own tribes. It was observed that the skin of the man thus restored was much disfigured, bearing the marks of a recent disease of an eruptive nature. The blacks having fulfilled their mission went away, but after a few days' absence returned to the settlement, saying that they came from Trial Bay. They were now affected by the same disease which had produced such an alteration in the white men, two of them being covered from head to foot with an eruption having, in all respects, the appearance of small-pox. The infectious nature of the disease was soon placed beyond all doubt, for it spread with frightful rapidity among the Port Macquarie blacks until scarcely an individual was free from the scourge, and in a very brief period large numbers died, while many of the warriors presented a hideous aspect. Every attention was paid to the sufferers, by order of the Commandant, Captain Smyth, at whose instance they removed from the settlement to the north side of the River Hastings, where they were supplied with such comforts as their pitiable state required, and the means of the settlement afforded. When questioned as to the origin of their affliction the natives insisted that the disease was introduced among their tribe by the white man whom they restored to custody; but, if this were true, it was strange as, indeed, it was otherwise strange—that not one instance occurred wherein the infection communicated itself to the white population of the settlement. As far as was possible, to prevent the spread of the disease, the Governor directed the surgeons of the colony to vaccinate, gratis, all who applied for that purpose, and the settlers were requested to induce the blacks to submit to the operation."—Flanagan, *History of New South Wales*, London, 1862, Vol. I., p. 364.

NEW SOUTH WALES MEDICAL GAZETTE, 1870-71, PAGE 215.

EXTRACTS FROM "WANDERINGS IN NEW SOUTH WALES."

By George Bennett, M.D.

As an epidemic of small-pox is now raging in London, the following graphic sketch of the disease, as it attacked the aboriginal natives of the colony several years ago, will be interesting to our readers:—

About two years previous an eruptive febrile disease made its appearance among the natives of Wellington Valley, resembling the small-pox in its principal characters. Some alarm was experienced in consequence among the Europeans, to whose children the disease had as yet been fortunately unknown. About a year after I was informed

it prevailed among the aborigines of the Lachlan, Burraborang, and Cox's River, and I remarked that several of the blacks at Goulburn Plains, and also at other parts of the colony, had pits on their faces, resembling those produced by small-pox, and which, they informed me, were caused by the disease in question. The name that this disease is known by among the aborigines is "Thunna, thunna," or "Tunna, tunna," and they describe it as being attended by sore throat, head-ache, and high febrile symptoms, upon the day previous to the appearance of the eruptions; the latter were described to me as commencing in a similar manner, and passing through the same stages as is usual in small-pox, covering the face and all parts of the body, even to the soles of the feet and palms of the hands; it was also stated that adults were more covered with eruptions, and suffered more severely from the disease, than children, and the aggravation of the symptoms caused much mortality among them. Among the children if often occurred that only a few scattered eruptions would appear, and the febrile symptoms also assume a very mild character. No deaths occurred in these cases.

As far as our information at present extends, it appears not to be an introduced disease, or at least we have no facts to prove such being the case. It is mentioned in *Tench's Account of the Colony of New South Wales*, 1795, that several natives had marks resembling those left by the eruptions of small-pox, and which I have no doubt originated from the disease the subject of this chapter. Several old men were marked by it; and I understand that during the time it prevailed among the aborigines at Wellington Valley, they did not regard it as of foreign introduction; they considered it contagious, and when one party was attacked by this formidable disease, the others deserted them, to avoid being infected. None of the soldiers' children stationed at Wellington Valley took the disorder, although the blacks about the settlement were suffering from it; the children never had had the small-pox, but I could not be informed whether they had been vaccinated.

This disease excited so much attention during the time it prevailed, that the Government were induced to send a medical gentleman into the interior to report upon, and give his opinion regarding its nature. Dr. Mair, assistant surgeon of the 39th Regiment, was deputed to this office. A more judicious selection could not have been made, although it may be regretted that his arrival was too late to observe its progress through the different stages, but he indefatigably devoted himself to procure such information as would place the nature of the disease almost beyond a doubt. The result was a collection of most interesting information upon its progress, character, &c., although several interesting points are still open for further medical observation and inquiry. On my return to Sydney, Dr. Mair kindly favored me with a copy of the report he made to the Colonial Government, and I have availed myself of many of his remarks, and have devoted a chapter to the subject, regarding it as one interesting to non-medical, as well as medical readers, as the same disease, or at all events one very closely allied to it, has been, and still too often is, the cause of much domestic misery and suffering.

As far back as the year 1789, says Dr. Mair in his report, an eruptive disorder, resembling the small-pox, broke out among the aborigines, and proved extensively fatal; its marks are still to be seen on the bodies of several of them of very advanced age, corresponding in appearance with the pits left by the small-pox. From that distant period no similar disease had been observed among them till about the month of August, 1830, when Mr. Brown, of Wallerawang, first saw this eruptive malady in five blacks, near the river Castlereagh, two in the incipient, and three in more advanced stages. He had, however, heard of its existence among the tribes to the northward six months before. One of these men was afterwards seen by Mr. Brown with pits like those of small-pox, on different parts of his body; and he ascertained that the others had died of the disease. Mr. Brown did not meet with any more cases of the disease till the beginning of August, 1831, when it manifested itself in three blacks, who had been in close communication with some others recently arrived from the Lachlan, and who had but a short time recovered sufficiently to be able to travel. These men stated that the disease had been raging in their part of the country, and that several had died of it. Some of the Wallerawang blacks, convinced of its contagious nature, had fled to Emu Plains to escape infection; three of the number having afterwards returned were seized with it.

At Wellington Valley the same malady was first remarked (as near as could be ascertained) in October last year (1830), and continued to affect the blacks in that vicinity to December. The poor creatures blamed Captain Sturt for its introduction, were much alarmed about it, and are represented as having anticipated some grievous calamity; a great fire and flood were predicted by one of their sages, which would come from Mount Harris and destroy them. From the testimony of George Clark, a convict, who had resided with the native tribes, far in the interior, for several years, and was lately taken prisoner by the mounted police, the disease proceeded from the north-west coast, and spared none of the tribes as far as Liverpool Plains, attacking 20 and 30 at a time, none escaping its fury. The king, or chief of the tribe, among whom Clark had

been naturalized, was first seized with it, and died, as had been predicted by the kradjee, or physician and soothsayer. He had previously been with a tribe situated near the sea, and it is probable may have seen the disease before, although he disclaimed having any but supernatural knowledge of it.

The plan of treatment followed in the case of the king was immersion in cold water; four persons of less note underwent the same, and only one survived. The consequence was, that other medicinal measures were thought of, and the cold bath was stigmatized and abandoned. Scorching the hair from the head, and pricking the pustules with a sharp-pointed fish bone, then squeezing out the fluid contained in them with the flat part of the instrument, was the next mode of cure adopted by the kradjee; and it is worthy of remark, that the operation suggested itself to him from the observation that the pustules burst spontaneously, and discharged whitish water, in the first case of recovery.

It is curious, observes Dr. Mair, that the very same process was recommended by Avicenna, the celebrated Arabian physician, who flourished in the tenth century of the Christian era, and gave the first complete history of the small-pox, with this only difference, that the learned author used a more delicate instrument, a golden needle, and even in the present day, the same practice is approved of by the best writers on the subject. The new method of treatment was attended with happier results than the old, only one out of six dying with the malady; and if, continues Dr. Mair, instead of entirely relinquishing the cold bath, it had still been employed with judicious caution, the mortality might have been further reduced.

The kradjee, priest, soothsayer, or physician (for he appears to exercise the function of each) goes through many superstitious ceremonies to cure his patient, with rods of 2 or 3 yards in length, which he fixes in the earth in a crescentic form, and addresses with a variety of gestures. The common people place implicit faith in his predictions; and it is asserted by Clark, that they sometimes bury alive those whom in his medical capacity he has abandoned. They believe the disease to be infectious, but do not shun one another on that account: they name it "Boulol." The Lachlan and Wellington tribes call it "Thunna, thunna;" and Dr. Mair also says that he heard a most lugubrious dirge chaunted at a corrobora at Bathurst, commemorative of this destructive epidemic, and judged accurately of its nature from the melancholy note and solemn manner of the psalms.

Dr. Mair continues to state in his report, that the disease seems to have assumed a considerable variety of forms in different individuals, but from the concurrent testimony of all the observers who were consulted, the following symptoms may be considered as common to all of them. For several successive days the patient feels languid, indolent, and oppressed, loses his appetite, suffers from headache, pain of chest or stomach, increased heat of skin, and other febrile symptoms. The usual duration of this incipient stage appears to have been from two to eight days. It was followed by an eruption of small red spots, resembling flea-bites, which generally commenced on the face, and gradually spread more or less thickly over the head, breast, and extremities; the tongue and lips were likewise involved in the eruption, and the soles of the feet have been particularly remarked in many instances to be numerously studded with it.

When the eruption had fully developed itself, which generally occurred within twenty-four hours, a remission was observed to take place in the febrile symptoms, but the patient began to complain much of pain in the throat, and could only swallow liquids. The small red spots, or papule, were converted into vesicles or pustules, in periods varying from three to seven or eight days; the fluid contained in these vesicles or pustules is represented by some as resembling whey, others milk, and by others to be yellowish or straw coloured, like the thin pus of sores. It was likewise described as bloody water. When at their height they were about the size of a pea. One very intelligent lady, who had witnessed its effects in several of the blacks, informed me the eruption was very like cow-pock. The greater number of persons who had watched its progress, and who had likewise seen the small-pox in England, pronounced it to be that disorder. Scabs formed and fell off at different periods, in different cases, according to the length of time occupied by the maturation of the vesicles or pustules; these were occasionally confluent on the nose and cheeks, and frequently left permanent marks or indentations on the skin.

Its usual duration is stated to have been from a fortnight to three weeks in cases of restoration to health; but even after the eruption had entirely subsided, and the disease might be considered over, the convalescents were unable to walk for a long time, owing to the tenderness of their feet, from which the cuticle had entirely separated. In many cases the other sequelæ of the disease were very distressing; some lost their eyesight, others had abscesses in different parts of the body, or foul and tedious ulcers, with great debility and emaciation. Death was said to happen generally among the Lachlan and Wellington Valley blacks about the third day after the appearance of the eruption; the tongue became much swollen, and covered with livid spots, the breathing greatly oppressed, and deglutition impracticable. Secondary fever was seldom observed, and

when it occurred seemed owing to cold; but the rarity of secondary fever is easily explained by the early fatality of the disease in the severe cases in which only it could have been expected. Some were said to have perished at the very onset of the malady, before there was the slightest sign of eruption.

Among the tribes to the north-west of Liverpool Plains, the disease seems to have approached more nearly to the description of confluent small-pox, as it is met with in Europe. The eruption coalescing on the face, and being followed in a day or two by salivation (or as Clark describes it, water pouring from the mouth as they lay on the ground), about the tenth or twelfth day, a sort of convulsive or epileptic fit took place, and afterwards the fluid from the mouth was of a bloody appearance, and more viscid, so as to be discharged with great difficulty.

This was considered the critical period, and was speedily followed by death, unless the patient soon after began to rally. The great difficulty and danger of this disease (the confluent small-pox), says Huxham, chiefly comes on at the state or turn of the pox; for however easily matters may have proceeded till this time, we are now (viz., the seventh, ninth, or eleventh day from the eruption) very often surprised with a very shocking change, and terrible symptoms. The salivation and viscid discharge from the mouth are particularly described by Sydenham, and other eminent writers on this disease.

It has been remarked, by most of the eye-witnesses of this epidemic, that it proved chiefly fatal to adults and old people, seldom to children, and that those who had suffered from it at a former period, as indicated by the marks on their skin, escaped it altogether, while there were few other cases of exemption. Dr. Mair proceeds to give, in his report, cases in which some Europeans were attacked by it, on which he has made some very excellent observations, and I regret that my limits will oblige me to exclude them from this work. Dr. Mair observes, that he met with no opposition on the part of the aborigines in his wishes to extend to them the inestimable benefits of vaccination; those who had not suffered from the late epidemic viewed their escape as accidental, and while its frightful symptoms and dire effects were yet fresh in their memories they were willing to submit to a simple operation, which, they were told, would henceforth protect them against the disease. Dr. Mair thus concludes his interesting and valuable report:—

“1. The eruptive febrile disease, which lately prevailed among the aborigines, was contagious, or communicable from one person to another, and capable of being propagated by inoculation.

2. It approached more nearly in its symptoms to the character of small-pox than any other disease with which we are acquainted, particularly to that species of small-pox described by Staff-surgeon Marshall, as occurring in the Kandyan Provinces in 1819.*

3. The mortality attending the disease varied from one in three to one in five or six, but might have been less if the persons labouring under it had been sheltered from the weather, and attended by physicians.

4. Vaccination seems to possess a controlling power over it, as three blacks who had been successfully vaccinated, although equally exposed to the disease, escaped infection.

5. It was not confined to the aborigines, but in one instance attacked a European in the form of secondary small-pox, and proved fatal to a child with symptoms resembling confluent small-pox.

6. In several cases it occasioned blindness, and left many of the poor blacks in a very debilitated and helpless condition, with marks which could not be distinguished from the pits of small-pox on different parts of their bodies.

7. It was never observed to attack any of the aborigines a second time, and it spread alarm and consternation among them.” Soon after Dr. Mair's report was sent in to the Colonial Government, an official notice was published in the *Sydney Gazette*, requesting parents to have their children vaccinated.

It has been mentioned in the papers this month (March, 1870) that “some strange sights are to be seen from the North-west Bend to below Swan River (remarks a Murray River correspondent of the *Kapunda paper*) on the sandhills in the bed of the river, that have been flooded for the first time (at least for about 100 years) by the 1870 waters. It has washed away the sand from these hills, exposing to view the remains of hundreds of aborigines in places where even the oldest amongst the white inhabitants had no idea these burial places existed. It appears that about 50 years ago the natives were attacked by the small-pox, and carried off in great numbers. The aged natives (bearing the usual marks of the disease) say that they were put in the ground, old and young together, two or three in a hole where they died, without ceremony, and not being fenced in the usual manner, the places were not known to the whites.”

This is not uncommon among the savage nations; the introduction of dysentery at Otaheite, or Tahiti, was attributed to Vancouver; and in Beechey's interesting narrative we are told that the Pitcairn Islanders had imbibed similar notions with regard to shipping alling at their island, of leaving them a legacy of some disease. Mr. Hamilton Hume

* Quoted in *Good's Study of Medicine*, vol. III., page 82.

(the well-known Australian traveller), who accompanied Captain Sturt in his expedition to the northward, says the natives were suffering severely from this eruptive malady when they arrived among them, and numbers had died, and many more were still dying, from its virulence. The description of the disease he gave me accords in most points with that given by Dr. Mair.

THE SMALL-POX IN AUSTRALIA.

To the Editor of the Argus.

Sir,—You ask for information about Small-pox in Australia, and you say that the information you have received indicates that the natives at the Murray River suffered from it about 40 years ago.

In April, 1789, it was found that the Sydney tribe was being swept away by the disease. Collins, an eye witness, reports that in nooks of the rocks, or upon the beach, their dead bodies were daily seen. Many of the tribe fled to the interior, terrified at the scourge which had appeared amongst them after the English settled in Sydney, in 1788.

A notice in the *Sydney Gazette*, signed by the principal surgeon, Thomas Jamison, gives the most authentic explanation as to the origin of the disease. He says (14th October, 1804), "It was generally accredited by the medical gentlemen of the Colony, on its first establishment, that the small-pox had been introduced among the natives by the crews of the French ships then lying in Botany Bay; but since that period no vestige of that disease has ever appeared."

It was ascertained afterwards that the disease committed ravages in the interior to which the alarmed natives had fled. But it seems to have died out in the uncongenial atmosphere of Australia. It is not so plain, as your information would imply, that the disease was at the Murray "some 40 years or more ago." It is true that in 1835 Sir Thomas Mitchell said of natives whom he saw near Fort Bourke, on the Darling, "Most of them had had the small-pox, but the marks were not larger than pin-heads. I found that they had either seen or heard Captain Sturt's party It seemed to me that the disease which it was understood had raged among them (probably from the bad water) had almost depopulated the Darling, and that these people were but the remains of a tribe." But Mitchell was mistaken as to the nature of the disease, as can be proved from Sturt's narrative, which was published in England in 1834, and was probably unknown to Sir Thomas Mitchell in 1835.

Sturt saw the natives suffering from a cutaneous disease which was decimating the tribe, but he did not call it small-pox. On the 5th February, 1829, he and Hamilton Hume pitied the grief of an old chief who showed them "several young men who had been attacked by this singular malady." . . . "It was evident their population had been thinned." . . . "Several of them carried fire-sticks under the influence of the disease, I have already noticed, while others were remarked to have violent cutaneous eruptions all over the body." We cannot suppose that Sturt would describe small-pox as a "singular malady."

Again, in 1830, Sturt followed the course of the Murrumbidgee and Murray. He described the filthiness of the natives and their loathsome diseases, but he saw nothing like small-pox, and he and his companions were continually "obliged to submit to an examination, and to be pulled about and fingered all over." There was evidently no small-pox on the Murray "some 40 years or more ago," though Sir Thomas Mitchell's look would lead a careless inquirer to think that there was.

I am, &c.,

(Sgd.) G. W. RUSDEN.

20th January, 1877.

THE ABORIGINES AND THE SMALL-POX.

To the Editor of the Argus.

Sir,—The leader in your issue of the 19th instant, relative to the fact of small-pox having (at least on one occasion) decimated the aboriginal tribes, induces me to send you the following extract from my work on our Colonial ethnology:—

I may premise that for twenty years, commencing in 1845, I never lost an opportunity for gathering material for the work in question, and that my position and pursuits during that time were exceedingly favourable for successfully carrying out that purpose:—

"All the very old aborigines in the Colony show very distinct traces of small-pox, and in speaking of the scourge which has so indelibly left the marks of its foul presence, they say that it came with the waters, that is, it followed down the rivers in the early flood season (about July or August), laying its death-clutch on every tribe in its progress, until the whole country became perfectly decimated by the fell scourge.

During the earlier stages of its ravages, the natives gave proper sepulture to its victims. At last, however, the death-rate assumed such immense proportions, and the panic grew so great, that burying the bodies was no longer attempted; the survivors who were strong enough merely moved their camps daily, leaving the sick behind to die unattended, and the dead to fester in the sun, or as food for the wild dogs and carrion birds, which battened to their hearts' content thereon."

Your authority makes a mistake when he says the wild dogs and carrion birds would not eat the bodies of the small-pox victims, as they quite lived on them during the continuance of the disease. This is one of the points on which the natives are most impassive.

"Ere long the whole atmosphere became impregnated with the fœtid odours arising from the multitude of decomposing bodies; and the poor natives began to think that not one would escape the dreadful air of dreaded death. At last, however, they became perfectly reckless, and cared but little whether they lived or died, that is, if death came to them by any other means than the pestilential scourge, but that manner of death was indeed a terror to them; and as self-destruction in not an aboriginal trait, they had to meet the King of Terrors in this most filthy guise as best they could.

From what we have been able to glean in our conversations with the natives on this scourge, we are inclined to think that it must have come from Sydney, and if about 40 or 50 years since the inhabitants of that city passed through the ordeal of this plague, there cannot be any doubt remaining on the subject of its origin.*

When the bright torrid summer displaced the moister weather of spring, the disease gradually died out, or had run its fatal course, leaving but a sorry remnant of the once numerous tribes behind, and it was many years before the panic then created was even partially forgotten.

To this day the old men of the tribes speak of the disease shudderingly, and with such an amount of loathing and horror as it is impossible for any other aboriginal evil to elicit from their inherent stolidity.

This small-pox infliction seems to be the only occasion (at least they do not retain any record of others) upon which great numbers died together from the same cause; it is, therefore, small wonder if the survivors do look back on the abominable scourge with feelings of the intensest dread. The natives attribute the pestilence to the malign and magical machinations of tribes with whom they were not on terms of amity. This, however, is only a matter of course, since they ascribe all the ills with which Dame Nature smites them to the same source."

The great interest felt by most colonists in the fast disappearing aboriginal race is my apology for occupying your valuable space.

I am, &c.,

(Sgd.) PETER BEVERIDGE.

The Green Hill, French Island,
22nd January, 1877.

To the Editor of the Argus.

Sir,—I am somewhat surprised to observe in this morning's *Argus* that Mr. Rusden denies the existence of small-pox on the Murray about 40 years or more ago. Of my own knowledge, I can testify there were two blacks, who died on the Edwards River about six years ago—one of these (Charlie), the king of his tribe, was much marked by the disease; the other (Jamie Bogie) was not only much scarred by the disease, but blind also—both of whom said they had the disease upwards of 40 years ago. Jamie Bogie, though blind, was one of the best divers and climbers in the tribe. Charlie always said that many blackfellows "tumbled down" at that time. Had these men been alive now, they would have been from about 54 to 57 years of age. From the above fact there can be no doubt the cutaneous disease Captain Sturt saw the blacks suffering from was small-pox, though he did not name it.

With regard to the dangerous suggestion to do away with quarantine for small-pox, a little experience of how this disease spreads, and is even fatal among people who have been vaccinated, should have restrained him. The decimation the Murray River tribes suffered about 40 years ago, shows that this climate is not more antagonistic to the spread of this disease than any other climate. I believe the reason why the disease became extinct must be attributed to the fact that the blacks always shift camp on a death taking place, and never use the opossum rugs or weapons of the deceased.

* Since the foregoing was written, I have been credibly informed that small-pox raged in Sydney about 1829 or 1830.

I would further point out that very little reliance should be placed on vaccination unless the lymph be taken from the cow, and not, as now, passed through one constitution to another from year to year, giving rise frequently to symptoms of blood poisoning, whilst immunity from disease must be very doubtful.

I am, &c.,

M.D.

22nd Jan., 1877.

SMALL-POX ON THE MURRAY.

To the Editor of the Argus.

Sir,—That small-pox decimated the aborigines dwelling below the great north-west bend of the Murray, I can positively say, and I believe that the period of about 40 years since is correct.

I have seen many natives whose faces were as deeply pitted as those so frequently met with in England 60 years ago.

On the banks of the Murray, nearly opposite to Blanche Town, there was, about 32 years since, a native cemetery, containing hundreds of graves of various sizes, and these it was said were the victims of a disease brought from Encounter Bay, a place much frequented by whaling ships long before the colonization of South Australia; the distance from one place to the other being about 100 miles.

The cemetery was on a large sandy flat, abounding with rare and beautiful blossoming shrubs. Each grave was enclosed by boughs, forming a rustic arbour, the sandy soil being heaped to a height of about 18 inches over each body. There were at that time many natives living who had recovered from the epidemic, and related the occurrence, but as there is an insurmountable barrier to all native tradition from the inviolable rule of never speaking of the dead, all corroborative information must come from trustworthy white men.

Intimate acquaintance and influence with the aborigines of South Australia for a period of some years induces me to send the above.

Yours, &c.,

THOS. MOULDEN.

22nd January, 1877.

To the Editor of the Argus.

Sir,—In reply to "M.D.'s" letter in this morning's *Argus*, permit me to say that I have seen scores of natives pitted with what was called in the bush "native-pock," and have known its effects to be mistaken even by experts for those of small-pox.

Under these circumstances, I hope I may be permitted deferentially to think it more likely that "M.D." may have mistaken the effects of a disease which he did not see in operation, than that Sturt and all his party saw small-pox in full career and did not know it, though, as most of them came from England, they must have been acquainted with its appearance.

Yours, &c.,

G. W. RUSDEN.

23rd January, 1877.

To the Editor of the Argus.

Sir,—I have read the letter of Mr. Rusden in your Monday's issue, and am a little taken aback at the positive assertions therein made, that small-pox cannot have been a disease of the aborigines of these colonies "some 40 years or more ago," as I have been under the impression that the opposite is the fact.

As I have not been resident in these colonies for the period mentioned, it is out of my power to speak of such a distant date as 1837, but I have a varied experience of the blacks of Victoria, Queensland, and South Australia, extending over a period of 29 years, and during all that time it has been matter-of-course belief with me that they were subject to attacks of the disease at periodical intervals.

When I was on the Upper Dawson River, in Queensland, in charge of the telegraph station at Taroom, about thirteen years ago, I saw many blacks whose appearance would lead anyone to think they had had the small-pox. They were pitted all over with good-sized marks, and one of the tribe was deaf and dumb, from some cause said or understood to be the result of this disease. Again, when in charge of Barrow Creek station on the overland telegraph line, I had occasion to visit Tennent's Creek—a station

175 miles north—and I saw there many blacks, whose skin showed all the appearances of small-pox; and as the natives there wear no clothing whatever, the multitude of marks on some of them was astonishing. Here, again, I saw a deaf and dumb black man, whose skin was marked all over as if he had suffered from small-pox, but as I am not a professional man, and for the further reason that converse with the Tennent's Creek blacks was out of the question, perhaps these marks were caused by something else. In any case, the marks were precisely like those left on the skin after recovery from the disease, and as far as could be ascertained, were caused by small-pox, or something very like it.

Yours, &c.,

“W.”

Benalla, 23rd January, 1877.

To the Editor of the Argus.

Sir,—Mr. Moulden's letter in to-day's *Argus* changes the venue but slightly, and refers to the same period as that mentioned by “M.D.”—“about 40 years since”—as the time when small-pox decimated the aborigines on the Murray River.

The place referred to by Mr. Moulden is below the great north-west bend of the Murray.

Of that locality we have an intimate knowledge from the works of Captain Sturt and Mr. Eyre.

Sturt, 47 years ago, saw much of the aborigines in that region, and was handled by them over and over again.

I am resolute in believing that he and his companion, Sir George McLeay, would not have endured such treatment if small-pox had existed then amongst the natives.

It is open to anyone else to think otherwise, but as a very old friend of Sir G. McLeay, who knew him to be remarkably intelligent, I hold to the faith I have expressed. The acquaintance of Eyre with the aborigines has been equalled by very few persons indeed.

Thirty-seven years ago he became an explorer in South Australia. In 1841 he was appointed resident magistrate of the Murray district, where he resided about three years with great advantage to the natives, to the colonists, and to science.

His report was as follows:—“A disease very similar to the small-pox, and leaving similar marks upon the face, appears formerly to have been very prevalent, but I have never met with an existing case, nor has Mr. Moorhouse (protector of aborigines in Adelaide) ever fallen in with one. It is said to have come from the eastward originally, and very probably may have been derived in the first instance from Europeans, and the infection passed along from one tribe to another. It has not been experienced now for many years.”

In my first letter to you, I said that it was ascertained, as the colonists spread inland, that the natives who died in 1789 from the imported scourge at Sydney, carried the small-pox with them, and that it committed ravages in the interior. No old colonist doubted the truth of this position. If confirmation were needed, it is partly furnished by such a statement as that of Eyre—that the disease reached South Australia from the eastward. Its progress was without doubt slow in some directions, but when Eyre spoke of it to the blacks on the Murray, there were many among them whose birth preceded the settlement of Port Jackson.

In all cases, the nomadic habits of the tribes, and the atmosphere of Australia, appear to have prevented the disease from becoming permanent among the natives.

I am, &c.,

G. W. RUSDEX.

24th January, 1877.

To the Editor of the Argus.

Sir,—With reference to the prevalence of small-pox amongst the blacks some 40 years ago, may I ask whether the native-pock can cause total blindness? I merely ask this question as it might determine whether it was really small-pox that the blacks suffered from. I certainly recollect one lad of about sixteen, in or about the year '42, amongst the Goulburn tribe, who was stone blind from the effects of some disease that had deeply pitted the eyes as well as the whole face. I also remember many more deeply pitted, and one or two others nearly blind from the same cause. I cannot remember any disease, such as native-pock, having affected them in this manner, or even deeply pitting them to any extent so as to disfigure them.

I am, &c.,

R. J. MURCHISON.

Kew, 24th January, 1877.

To the Editor of the Argus.

Sir,—I am glad to see in Mr. Beveridge's letter in to-day's *Argus*, a statement so confirmatory of the accounts given to Mr. Eyre on the Lower Murray, as to the direction from which small-pox invaded the natives.

Mr. Eyre says it went to South Australia from the eastward. Mr. Beveridge, for whose observations I have great respect, says it descended the rivers from the East Coast range.

That it was not in existence on the Upper Murrumbidgee 40, or even 50, years ago, is well known. There were cattle stations on that river near Gundagai nearly 50 years ago. Hume passed through the district in 1824, Sturt in 1830.

The very old blacks, seen when Mr. Beveridge commenced his researches 32 years ago, would easily remember the plague they saw in the end of the last century.

It was in 1789 that small-pox was carried across the mountains. Introduced by the French in January, 1788, its ravages did not prostrate the Sydney tribe until early in 1789. It would, therefore, be expected that not till towards the end of the century would distant tribes in the interior suffer in like manner.

I think Mr. Beveridge has been misinformed as to the raging of small-pox in Sydney in 1829–30. It was not among the aborigines then. They had been almost all improved off the face of the earth by other marks of civilization. Newspapers of the day will prove whether it came at that time by ship, and was arrested (as it was here some years ago) by vigorous measures.

One word I may say to your correspondent "W." His observations extend to 1848. About thirteen years ago he saw a native in Queensland "deaf and dumb from some cause, said or understood to be the result of small-pox."

Again, he says, "at Tennent's Creek I saw another deaf and dumb man, whose skin was marked all over as if he had suffered from small-pox, but as I am not a professional man, and for the further reason, that converse with the Tennent's Creek blacks was out of the question, perhaps these marks were caused by something else."

Perhaps they were; and if so, one wonders why "W." wrote about them, unless to let people know that he thinks deaf and dumb aborigines have marks caused by small-pox, or by something else.

However that may be, there is no doubt that throughout the whole period "W" speaks of there has been a host of professional men scattered throughout Australia, from Port Curtis to Adelaide.

As medical practitioners, or following country avocations, professional men have lived amongst the aborigines at Queensland, and throughout New South Wales, Victoria, and South Australia, during "W.'s" period.

Has one case of small-pox amongst the aborigines been proved to have existed during that time? If not, I submit that "W." is out of court.

Yours, &c.,

G. W. RUSDEN.

27th January, 1877.

To the Editor of the Argus.

Sir,—Though a good deal has been said of late in your columns concerning the existence of small-pox amongst the Murray tribes of blacks some 40 or more years ago, the matter to my mind, to judge of those who read by such as have written, seems hardly yet to have received its due weight with the public, in view of a belief which appears to possess people, that there is something in the air of the Australian continent which acts as a preventive of the disease—hallucination, as it seems to me, than which nothing can be further from fact, nor more dangerous.

Mr. Rusden, who, if I mistake not, led the way on this subject in his letter of the 20th instant drew attention on the authority of Collins to the fact, that in April, 1788, the Sydney blacks were being swept away by small-pox. Passing over that, Mr. Rusden has inadvertently fallen into an error of a year in quoting Collins's date. It may be noticed that, in addition to Collins, Hunter, Barrington, and Wentworth give more or less full accounts of the horrors which occurred on the occasion, and of how such of the blacks as had not yet been stricken down fled to the interior to escape the destroyer, bearing about them inevitably the seeds of a wider destruction. With the flight of the survivors, however, we lose for the time all traces of them and the disease, our countrymen at the period not having yet left the margin of Sydney Bay. The immediate result to the whites, however, of whom only one had succumbed, was the importation of vaccine matter from England.

The next record we have of small-pox, though it was not recognised as such, was in 1829, when Sturt relates (in a passage to which Mr. Rusden draws attention) that the blacks on the Darling, a tributary of the Murray, were suffering from what he terms a "singular malady, which showed itself in the form of a violent eruption all over the body." Sir Thomas Mitchell, however, who followed Sturt to the Darling in 1835, recognised by its traces as small-pox the disease which had puzzled Sturt in its active form. Both authors agree, however, as to the great mortality which it had occasioned among the tribes, as Mitchell says, "almost depopulating the Darling." In 1831 Sturt made his celebrated exploration of the River Murray, and in his account of the trip refers on several occasions to certain virulent diseases from which the numerous tribes he met were suffering. On one occasion he says, "leprosy of the most loathsome description, the most virulent cutaneous eruptions and glandular affections, absolutely raged through the whole of them." Now, what was this leprosy, this virulent cutaneous disease of which no one has ever heard since? Would Sturt have known leprosy if he had seen it? What has become of it? All we know on the subject is that ten years after Sturt's gallant whaleboat voyage, Eyre resided on the Lower Murray, and recorded the facts that a "disease very similar to the small-pox, and leaving similar marks upon the face, appears formerly to have been very prevalent, but I have never met with an existing case. . . . It is said to have come from eastward originally." Here we have a second instance of Sturt's failure to recognise small-pox, and of another who came after him doing so. In confirmation of Eyre's statement we have also that of Taplin, who speaking of some of the Lower Murray tribes, says: "They have a tradition that some 60 years ago a terrible disease came down the Murray and carried off the natives by hundreds. This must have been small-pox, as many of the old people now have their faces pitted, who suffered from the disease in childhood. The destruction of life was so great as seriously to diminish the tribes." Hence we see that in one direction at least, small-pox found its way from sea to sea. That such was the case, I have never known any one to gainsay, except Mr. Rusden, who reiterates that at that time small-pox did not exist on the Murray, his argument being that had it existed, Sturt and McLeay would not have allowed the sufferers, as they did, "to pull them about and finger them all over." Setting aside an argument which can have no force whatever until it has been shown that Sturt was acquainted with the appearance of small-pox, which there is every reason to believe he was not, it may be remarked that Mr. Rusden invites us to believe that though the explorers "would not have endured such treatment (*i.e.*, pulling about and fingering) if small-pox had existed among the natives," the explorers had no objection to the friendly hug of mere leprous savages, a peculiarity of taste which it is strange to see extending to a whole party.

In conclusion, I beg to remark that towards the close of 1841, or the beginning of 1842, being then resident with one of my brothers close to the junction of the Goulburn and Murray, we saw a blackfellow absolutely suffering from small-pox, a circumstance concerning which my brother and I had some conversation a few weeks since. I need hardly add that a large number of blacks in the neighbourhood had faces pitted, furrowed, and distorted with small-pox. A few of these probably yet remain. As regards "native pox," unless a sort of pustular itch from which both the blacks and their dogs used to suffer, be indicated by the term, I may frankly confess that I never saw during my 35 years' experience anything among them to which I can suppose it to refer. One medical man, I notice, refers to it, and it would be interesting to know in what year and in what locality it was met with, and what medical men generally think on the subject.

I am, &c.,

EDWARD M. CURR.

To the Editor of the Argus.

Sir.—I may say the reading of the correspondence in your columns on the above has caused considerable interest, and shows how different may be the recollections of those of 40 years ago. In having a finger in the pie, I may say Mr. Rusden's research and explanation are certainly founded on reasonable conclusions as to the fact of the disease having visited Port Philip (Victoria) before its occupation by the whites.

In 1837, Captain Hutton, of the East India Company Service, occupied the country north of the junction of the Coliban and Campaspe River, having his home station on what is now known as the Wild Duck, then the Vincent, near its junction with the M'Ivor Creek. His lowest station on the Campaspe was where now stands the Clare Inn, and the river spanned by a beautiful bridge.

Up to the month of May, 1838, the blacks were on the ground, apparently friendly with us, but covertly hostile, as it proved, for they killed the men, and took away the sheep, about 800, making for the Murray, and had reached the "Big Plain," now Rest-down, before they were recovered.

I can very well remember several aborigines being marked by small-pox, but the aborigines who claimed the country termed them Murray blackfellows. To the best of my recollection they must have been about 40 years of age, and they must have joined those of the Campaspe from near the Major's line, as Mitchell's track was termed, after the terrible punishment inflicted on the tribes by the whites after the killing of Mr. Faithfull's men on that line.

In the discussions, it was fully understood that the disease had been amongst those tribes, but I never recollect seeing a young person marked belonging to any of the tribes. Hutton's out-station on the Campaspe was the most northern at that time, and the whites as yet (1838) had not occupied any country below the junction of the Goulburn and the Murray in September of that year; the lower Murray being unknown excepting as far as Sturt and Hume were concerned.

In reference to Mr. Beveridge's letter, the tradition that the disease, as the blacks termed it, "came along a big one water," from the eastward, is in all probability correct, for a year or two in the aboriginal memory was a very long time; and the breaking up and scattering of the tribes before the occupation of the whites was not a very unusual affair in those days, the scarcity of water forcing them to keep their line of occupation on the best water country and avoid the great northern plains.

Yours, &c.,

JAS. MOUAT.

Eaglehawk, 31st January, 1877.

To the Editor of the Argus.

Sir,—In your issue of yesterday's date I noticed a letter signed "R. J. Murchison" relative to a disease similar to small-pox to which the natives of Australia have been subject and a wish is expressed for information confirmatory or otherwise of that disease being real small-pox.

Having occupied a station at Streaky Bay, in the Colony of South Australia, in 1855, when the disease was very prevalent in the nature of an epidemic among the natives of the western district of that colony, many instances came under my notice, and one in particular, which would go far to show that the disease was wholly different from small-pox, though similar in some respects.

The one instance I would offer as an illustration was that of a native lad of about eighteen years of age, who had been employed about the station, who was attacked by this disease at shearing time, when there were many whites about, and who had not recovered when the shearing was over, and who at one time was wholly unable to move or to assist himself in any way.

During the whole of the time of this lad's illness my second son attended to him, carrying him each evening into a hut, and taking him out (as was his own wish) to his camp every morning. As he was in close contact with my son on these occasions, and he escaped the infection, I should suppose the conclusion to be that this disease could not possibly have been small-pox, or my son would not have escaped.

I may here observe that owing to the care taken of him, the native lad recovered. Many of the natives died, but I think more from neglect and want of care by their own friends, than from the effects of the disease.

I may also say that the natives were about at many stations suffering from the above-mentioned disease, that there were children at many of the stations, and that in no instance did the infection extend to any of the whites.

I am, &c.,

H. C. HAWSON,

of Burra Darling District, N.S.W.

Deniliquin, N.S.W., 27th January.

To the Editor of the Argus.

Sir,—While residing at Swan River for twelve years, from 1840, I knew several old natives who were deeply pitted with what we believe to be small-pox, which they had suffered from long prior to the settlement of the colony in 1829.

I remember joining in a discussion on the subject between Governor Hutt and Dr. Harris, the Colonial Surgeon, when the latter expressed his conviction that the marks had been occasioned by small-pox, and thought it might have been introduced by the French towards the end of the last century, or possibly by some whaler.

I am, &c.,

"AN OLD AUSTRALIAN."

Ballarat Club, 1st February.

To the Editor of the Argus.

Sir,—As the existence of small-pox on the Murray 40 or more years ago, is a question to which a good deal of interest attaches, I must seek your indulgence for insertion in your columns of some remarks on Mr. Rusden's letter of the 30th ult. on that subject. In it, Mr. Rusden calls in question the veracity of the statement made by me, that both my brother and myself had witnessed a case of small-pox amongst the aborigines in about 1841 or 1842, and has proposed to me several questions whereby to test, not the correctness but the truthfulness of what I have advanced, to which, with your permission, I will now reply. This I should have done some days back, had it not been that I was desirous of obtaining further evidence on the subject. Such evidence I have fortunately been able to obtain from Mr. Elliget, whose letter you will perhaps be good enough to have printed with mine. It requires no comment, except that the country which Mr. Elliget refers to was a portion of my father's run, and the tribe the same amongst which I have seen small-pox. Before coming to the point, however, I will take this opportunity of pointing out as regards the date quoted by Mr. Rusden in his letter of 30th ult., to which in my former letter I drew attention as an error, that I find that I was wrong and Mr. Rusden quite correct. Two dates occurred in the same paragraph of Mr. Rusden's letter, and, writing hurriedly, my eye caught the wrong one, and hence my mistake. Fortunately however, I merely alluded to his date *en passant*, and it had no particular bearing on the subject of our original difference. On this question as to whether Sturt's failure to recognise small-pox was sufficient to invalidate the statements made by Mitchell and Eyre to the contrary effect, I have no doubt my arguments have been found by Mr. Rusden to be conclusive, as though he has returned to the general question, he has been discreetly silent on this particular, a circumstance not to be wondered at, as he must perceive, one would think, that the position he originally took up amounted to a declaration that, because Sturt had not seen small-pox on the Murray when he was there, therefore Eyre, Toplin, Mr. Beveridge, and myself were mistaken when we asserted that we had seen the disease or its traces at subsequent periods. It is also noticeable that Sturt himself, though not on the best of terms with Mitchell, and somewhat given to show up the shortcomings of that officer, never, as far as I can learn, attempted to traverse the adverse statements of the Major and Mr. Eyre in this particular, though he had ample opportunity for doing so.

To proceed, then, with the matter in hand, I have asserted in my former letter (though not with the details now given) that in 1841 or 1842, my brother and I, and some of our men, saw on my father's station an aboriginal child suffering in the most unmistakable manner from small-pox; that the mother or the child expressed great anxiety about its life—an anxiety which never occurs in cases of the ordinary "bora," the only other skin disease which I have noticed amongst the blacks; that the child was brought to my head station, hid in a mia-mia of boughs specially made to exclude the sun from it, and that it remained at the station a day or two at least. As to the ultimate fate of the child I never knew, or have forgotten it. As what Mr. Rusden has written unmistakably calls in question the *bona fides* of this statement, and leads to the impression that what I have advanced might be a mere fabrication, designed to sustain an argument, I think it right to remark that about three months back and consequently long previous to the discussion of this question in your columns, I mentioned in conversation to Mr. Henry F. Gurner, of St. Kilda, the fact of my brother and myself having seen a case of small pox as related, with some other facts connected with the subject. This conversation, Mr. Gurner assures me, he distinctly remembers, and to him I have much pleasure in referring Mr. Rusden.

Consequent on the assumption that the statement made by me was an untruthful one, Mr. Rusden proceeds to put to me what to his mind are evidently crucial questions concerning it; as whether the medical men of the country were consulted, and "whether the fact was reported to Mr. Latrobe," the superintendent, intimating that unless some steps were taken, and that unless I am able to support my assertion with "skilled evidence," it must be relegated to a certain class of "rumours" which he particularizes.

Before answering these questions, I think it desirable to remark that this necessity for medical and skilled evidence does not seem to have suggested itself to Mr. Rusden in the case of Sturt, McLeay, or Eyre, and yet, as far as I am aware, the unsupported evidence of those gentlemen has not in any point of view, perhaps, any greater claim to reliability than my own. Mitchell's party had a medical assistant attached to it, but Mr. Rusden has no reliance on Mitchell. It may also be noticed that in his letter to you of 23rd January, Mr. Rusden "deferentially" throws overboard your medical correspondent "M.D.," who relates that he had seen blacks on the Edwards scarred and blind from small-pox; so that, as far as can be seen, so long as statements coincide with Mr. Rusden's views he is not by any means hypercritical concerning their source; that he accords to them a value to which medical testimony must not aspire if it point to conclusions at variance with his own. When such is the case, when witnesses relate inconvenient facts, an accuracy fit suddenly comes over him, and he asks for proofs, which he

should know, from the very nature of things, cannot be produced; and, without waiting for a reply, in mock heroics condemns the refractory subject provisionally to the abode of rumours and the "ivory gate."

As regards consulting medical men and reporting to Mr. Latrobe then (as probably occurred in the case of Mr. Hawson and Mr. Elliget), I must frankly admit that I did neither. In extenuation of such an improper course, I may remark that probably the idea never occurred to me, and that if it did it would certainly have been dismissed, as only leading to a troublesome and useless step; troublesome, as I had plenty to do in those days in looking after "my father's flocks," without, as there were no posts in my neighbourhood, riding 300 miles to see doctors and report to the superintendent; useless, as no practical good could have resulted from such a step, for even your correspondent might know that the blacks in those days, in the locality in question, would have been no easier to physic or vaccinate than the kangaroo, and would in all probability have lanced any strange doctor who was imprudent enough to approach them with bottle or lancet. As regards the vigour of Mr. Latrobe's Government, to which Mr. Rusden refers, it may not be out of place to remind the gentleman of the utter failure of every measure undertaken by the superintendent with respect to the blacks, and that though money enough was spent on them, his protectorate policy and his endeavours to prevent them being shot down proved alike abortive.

Should Mr. Rusden be capable of a calm reconsideration of the subject, he will probably discover that almost every assertion made by him has proved incorrect, and that in view of a mass of evidence to the contrary, Sturt's impressions and his own dictum, "that there was evidently no small-pox on the Murray some forty or more years ago," must be held to be alike erroneous. On the subject of our aborigines generally, it may be pointed out that it is common to meet persons who have lived in the bush, and seen the ordinary ways of the blacks, but who know perhaps nothing of any of their languages, and have never inquired into any single circumstance connected with either their history or customs, and who at the same time really believe themselves to be quite authorities concerning our aboriginal race. Of such Mr. Rusden is possibly an instance.

As regards that gentleman, his rudeness and his erudities, Sir, I shall trouble you no further; he first took up the subject, and, so far as I am concerned, shall be welcome to the last word.

I may add, in conclusion, that, for some time, I have interested myself with the subject under discussion; that several important facts connected with it, which, as far as I know, have not attracted any one's attention, have come to my knowledge; and hope to have the pleasure some day, when I shall have exhausted all sources of information accessible to me, of laying the result of what I have learned before the public. That I did not, when you asked for information concerning small-pox, state what little I know about it, must be attributed to my impression that it is decent to endeavour to learn before one undertakes to coach up the public.

I am, &c.,

EDWARD M. CURR.

5th February.

The following is Mr. Elliget's letter:—

My dear Sir,—I am in receipt of your note of yesterday's date. I have not seen the correspondence in *The Argus* to which you allude. I don't remember the particular case you refer to—of a child being brought to the head station on the Goulburn suffering from what appeared to be small-pox—but I have seen others similarly affected—having eruptions on the face and body similar to what is caused by small-pox.

In the beginning of 1845, when I first went to the Moira, I noticed several of the blacks, whose appearance clearly manifested their having suffered from small-pox, or something of a kindred disease, which left the face deeply pitted with marks similar to those left on Europeans by small-pox—a man called Mackenzie, of the Bangarang or Moira tribe, being the most marked of any, in fact, his face was as completely pock-pitted as that of any white man I have ever seen. The faces of others in the same tribe bore evidence of having suffered from a similar cause, notably Davy, the chief, another called Lanky, and one named Nosey—all of whose appearances I have a distinct recollection of.

You are at perfect liberty to make what use you please of any information contained in this note.

I am, my dear sir, yours very truly,

EDMUND ELLIGET.

Edward M. Curr, Chief Inspector of Stock, Melbourne.

APPENDIX B.

SOME DISEASES PECULIAR TO, OR OF INTEREST IN, AUSTRALIA.*

By J. Burton Cleland, M.D., Ch.M. (Sydney).

(Principal Assistant Microbiologist, Government Bureau of Microbiology, Sydney).

Australia, for a large-sized country, is unique in the history of the world from the medical point of view. Unlike other continents, it may be said to have practically no diseases of its own—either those peculiar to it or common elsewhere. It is true that to-day we have quite a number of illnesses to which man is subject, but these are, with very few exceptions, introductions. When the white man first came to Australian shores, it is doubtful whether there were any formidable diseases amongst the natives. Malaria would seem to have been introduced from outside, phthisis was undoubtedly so, and the various other infectious diseases were almost certainly foreign to the autochthonous inhabitants. The reason for this phenomenal state of the public health must be sought in two factors, viz., isolation from the rest of the world and sparseness of population. Isolation meant that diseases prevalent elsewhere would not, or would very rarely, gain entrance to Australia; scarcity of population meant that those diseases of a communicable nature that accompanied our aborigines at the time they were separated from the rest of the world would, from lack of means of spread in virgin soil, eventually die out. Even to-day, we see this difference in a marked degree, when we compare our own land with tropical countries. Here we have a white population with a few scattered aborigines, there we see small bands of Europeans in the midst of dense millions of coloured people, the latter living in insanitary conditions and the prey of many parasitic diseases, helminthic, protozoal, and bacterial. It is sad for us to reflect on, but it is a fact, that nearly all the preventable diseases we suffer from here were introduced by our ancestors, whose sins of commission, done in ignorance, are visited on the heads of us, their children.

But the very facts mentioned above add an interest to the study of diseases in Australia. The history of the introduction and spread of many diseases is not only of interest to us, but also may be of value in tracing out the etiological factors responsible for them. We may therefore enjoy opportunities for research here denied to other countries. The small amount of historical research I have already been able to do in this direction, has already shown me the value to be attached to such work.

Moreover, as the term "disease" is to be interpreted in a broad sense, as indicative of the processes of reaction and repair to injuries to our bodies of all kinds it includes many side-issues of medical interest beyond ailments of microbic origin, such as injuries from animals in the way of bites, stings, and venoms, as well as the effects of poisonous plants, &c.

You will see, therefore, that the subject before us is really one of great magnitude, and you will note that I have realized this in the title to this paper, which shows that I only intend, in the short time at our disposal, to deal with some of the many diseases that thus present themselves. For some years now, I have been collecting data for the history of disease in all its branches—introduction, geographical distribution, etiology, features peculiar to this part of the world—as it affects Australia, and I intend to submit to you to-night some of the results of these labours. The matter I submit is fragmentary, and in places you will see no connexion between diseases which follow each other—but this I hope you will forgive, and I trust that an interest will be awakened in you to aid in collecting data for further work.

The disease I intend to deal with first is one that proves of great moment to us to-day—small-pox. Though introduced to our shores many times, though moderately severe epidemics have broken out amongst us, the disease has been held in check each time, and finally overcome. Historically, it is one of the first diseases recorded for Australia, for an epidemic of it broke out amongst the natives of Port Jackson a year after the first settlement. The cases were confined to coloured people, and never appeared amongst white men for many years afterwards. The history of all the outbreaks in white men, and of the ships arriving with the disease is so lengthy, that I will not deal with it here, but will confine myself to the records of the outbreaks amongst the aborigines, which have been far more extensive and severe than most of us are aware of. Much discussion, as you will see, has arisen over the origin of the first outbreak near Sydney, some attributing it to La Perouse's vessels, others to overlooked cases of small-pox among the first convicts. The later outbreaks amongst the natives seem, to my mind, to indicate quite a different origin, an introduction into Northern Australia by Malay prahus, and thence

spread in various directions, eventually in one case to Sydney. This is paralleled by a similar introduction to the north in the sixties which unquestionably spread as far as the Great Bight.

THE HISTORY OF SMALL-POX AMONGST THE ABORIGINES OF AUSTRALIA.

The first references to a disease which there seems no reasonable doubt to consider as really small-pox occur in the works dealing with the foundation of the colony of New South Wales. Collins,* for instance, thus graphically describes the conditions of things amongst the natives :—

“Early in the month of April, and throughout its continuance, the people whose business called them down the harbor, daily reported that they found either in excavations of the rocks, or lying upon the beaches and points of different coves, the bodies of many of the wretched natives of the country. The cause of this mortality remained unknown, until a family was brought into the settlement and the disorder pronounced to have been small-pox. It was not a desirable circumstance to introduce a disorder into the colony which was raging with such fatal violence among the natives of the country, but the saving of the lives of any of these people was an object of no small importance, as the knowledge of our humanity and the benefits which might be rendered them, would, it was hoped, do away with the evil impressions which they had received. Two elderly men, a boy, and a girl were received and placed in a separate hut at the hospital. The men were too far overcome by the disease to derive any benefit from the exertions of the medical gentlemen who attended them; but the children did well. From the native who resided in the settlement it was understood that many families had been swept off by this scourge of the human race; and that others, to avoid it, had fled into the interior parts of the country. Whether it had ever appeared among them before could not be discovered; but it was certain that they gave it a name (*gal-gal-la*); a circumstance which seemed to indicate a pre-acquaintance with it.

On the recovery of the native boy and girl from small-pox, the latter was taken to live with the wife of the clergyman, and the boy with the head surgeon, to whom, for his attention during the time he was under his care, he seemed to be much attached.

While the eruptions of this disorder continued upon the children, a seaman belonging to the *Supply* was seized with it, and died; but its baneful effects were not experienced by any white person of the settlement, although there were several very young children in it at the time.

It had been greatly feared, from the first introduction of the boy and girl into the settlement, that the native who had been some time there, and whose attention to them during their illness excited the admiration of every one that witnessed it, would take the disorder; as on his person were found none of those traces of its ravages which are frequently left behind. It happened as had been predicted; he fell a victim to the disease in eight days after he was seized with it, to the infinite regret of every one who had witnessed how little of the savage was found in his manner, and how quickly he was substituting in its place a docile, affable, and truly amiable deportment.

Again, in speaking of the diseases of the natives, he thus refers to this disease :—

“In the year 1789 they were visited by a disorder which raged among them with all the appearance of the small-pox. The number that it swept off, by their own accounts, was incredible. A native who at that time resided in Sydney, on going down to the harbour to look for his former companions, was described by those who witnessed his emotions as suffering the extreme of agony. He looked anxiously into the different coves that they visited; not a vestige on the sand was to be found of human foot; the excavations in the rocks were filled with putrid bodies of those who had fallen victims to the disorder; not a living person was anywhere to be met with. It seemed as if, flying from the contagions, they had left the dead to bury the dead. He lifted up his hands and eyes in silent agony for some time; at length he exclaimed, ‘All dead! all dead!’ and then hung his head in mournful silence, which he preserved during the remainder of their excursion. Some days after, he learned that the few of his companions who survived had fled up the harbor to avoid the pestilence that so dreadfully raged. This poor fellow’s fate has already been mentioned. He fell a victim to his own humanity, when several of his countrymen were taken to the town covered with eruptions of the disorder, which had not confined its effects to Port Jackson; for on visiting Broken Bay the path was in many places covered with skeletons, and the same spectacles were to be met with in the hollows of most of the rocks of that harbour.

Notwithstanding, the town of Sydney was at this time filled with children, many of whom visited the natives that were ill of the disorder, not one of them caught it, though a North American Indian belonging to Captain Ball’s vessel died of it.

* *The English Colony in New South Wales, 1788 to 1801.* By Lieut.-Col. David Collins.

To this disorder they gave the name of Gal-gal-la : and that it was the small-pox there was scarcely a doubt ; for the person seized with it was affected exactly as Europeans are who have that disorder ; and on many that had recovered from it were seen the traces, in some the ravages on the face."

Hunter thus refers in May, 1789, to the death of the native Arabanoo, or Manly :—

"Five or six days after my arrival, poor Arabanoo was seized with the small-pox, and although every possible means for his recovery was used, he lived only to the crisis of the disease. On an expedition to Broken Bay in June, they met with a further case : information was immediately brought to the Governor, and we all went to see this unhappy girl, whom we found just recovered from the small-pox, and lame : she appeared to be about seventeen or eighteen years of age, and had covered her debilitated and naked body with wet grass, having no other means of hiding herself."

Bladen* thus summarizes the question as to the origin of the epidemic, whether indigenous or introduced by the vessels of La Perouse or by the English themselves :—

"The French have been charged (Rusden, *History of Australia*, vol. i. p. 131) with having 'wantonly fired upon' them, and also with having spread the small-pox among them—a disease which swept them off in great numbers. There does not seem to be any foundation, beyond mere conjecture, for either of these imputations.

As to the small-pox, the evidence against the French has been collected by Rusden, vol. i., p. 134. It consists substantially of two assertions : (1) That 'the early settlers, when able to converse with the natives, came to the conclusion that small-pox had been introduced by the French'; and (2) that 'the natives (in the far interior) concurred in declaring that only at that epoch were its ravages heard of amongst the tribes, and none but the aged bore traces of it in 1835.' The testimony of the early settlers and the natives, thus alleged, amounts to nothing more than tradition, and is not entitled to any weight unless it can be connected with ascertained facts. The facts here are altogether against the tradition. Among 'the early settlers,' the best witnesses are the men who made it their business to ascertain and record in their journals every fact of interest or importance that came within the range of their observation. Both Collins (p. 65, 597) and Hunter (p. 134) record the outbreak of the small-pox in April, 1789 ; but neither of them makes any reference to the French in connexion with it. Had there been any reason to suppose that it had been introduced by them, it is not likely that either of these chroniclers would have omitted to say so. Their silence on that point may be easily accounted for. The simple fact that the disease did not make its appearance until April, 1789, more than twelve months after the French ships had sailed, is enough to show that there could not have been any reason for connecting the two things together. Had the germs of the disease been introduced by the French, it could not have failed to make itself known very soon after their departure ; and if any of the Frenchmen had been suffering from it while in Botany Bay, the fact could not have escaped the notice of the English officers, who frequently exchanged visits with the strangers.

The only foundation for the supposition seems to lie in an allusion contained in one of Phillip's despatches, in which he said :—'Whether the small-pox, which has proved fatal to great numbers of the natives, is a disorder to which they were subject before any European visited the country, or whether it was brought by the French ships, we have not yet attained sufficient knowledge of the (native) language to determine. It never appeared on board any of the ships on our passage.'

If Phillip had been aware of any fact or circumstance pointing to a French origin of the disease, he would not have omitted to mention it ; and it may be assumed that whatever was known on the subject at that time was known to him. How the French came to be mixed up in the matter at all may be seen in the following passage from Tench (Completo Account, p. 18), where the idea appears in the shape of a query.

No solution of this difficulty had been given when I left the country, in December, 1791. I can, therefore, only propose queries for the ingenuity of others to exercise itself upon. Is it a disease indigenous to the country ? Did the French ships under Monsieur de la Perouse introduce it ? Let it be remembered that they now had been departed more than a year ; and we had never heard of its existence on board them. Had it travelled across the continent from its western shore, where Dampier and other European voyagers had formerly landed ? Was it introduced by Mr. Cook ? Did we give it birth here ? No person amongst us had been afflicted with the disorder since we had quitted the Cape of Good Hope, seventeen months before. It is true that our surgeons had brought out variolous matter in bottles ; but to infer that it was produced from this cause were a supposition so wild as to be unworthy of consideration.

The most probable of these suppositions is that it was 'indigenous to the country'—or rather, that it was a disease which originated among the natives, as a natural result of their habits of life. Some confirmation of this theory may be found in the fact that

* *History of New South Wales*, from the Records, Vol. I., 1783-1780, pp. 522-525.

it has been observed under circumstances which clearly repudiate a French origin. Major Mitchell, for instance, found it among the natives whom he met with after crossing the Liverpool Range in 1831.

We reached, at length, a watercourse, called by the natives Currangai, and encamped upon its banks beside the tribe from Dartbrook, which had crossed the range before us, apparently to join some of their tribe who lay extremely ill at this place, being affected with a virulent kind of small-pox. We found the helpless creatures stretched on their backs beside the water, under the shade of the wattle or mimosa trees, to avoid the intense heat of the sun. We gave them from our stock some medicine; and the wretched sufferers seemed to place the utmost confidence in its efficacy. *Three Expeditions*, p. 26.

There is some positive testimony, on the other hand, to show that the French had nothing to do with the matter. Lieutenant King referred to it in his journal in these terms (Hunter, p. 406):—

‘This dreadful distemper, which there is no doubt is a distemper natural to the country, together with the difficulty of procuring a subsistence, renders the situation of these wretches truly miserable.’

As King was in daily communication at that time—April, 1790—with Phillip and all the officers of the establishment, it is not conceivable that he could have been under any misapprehension on the matter. The opinion expressed by him was evidently the public opinion of the time.”

Wentworth* mentions this same outbreak which had quite disappeared at his time of writing. He says:—

“Infantile diseases are almost unknown; the measles, whooping cough, and small-pox being entirely so. The small-pox, however, at the epoch of the foundation of the colony by Governor Phillip, and for a short while subsequently, committed the most dreadful ravages among the aboriginal natives. This exterminating scourge was probably introduced by the crews of the vessels of Monsieur de la Perouse, who remained for a short period in Botany Bay, whilst our fleet was lying in Port Jackson; and, during his stay there, established an intercourse with the natives; although Captain Cook could not with his utmost endeavours effect this object. As they had, therefore, no communication with the seamen of Cook’s vessel, the *Endeavour*, and, as there was no instance of small-pox to be found in the fleet under the command of Governor Phillip, it would seem that they could only have caught this dreadful pest from the crews of the vessels belonging to this celebrated French navigator. Some few of the contemporaries of those persons who fell victims to this malady are still living; and the deep furrows yet visible on their sable countenances show how narrowly they escaped the same premature destiny. The recollection of this scourge will long survive in the traditional songs of this simple people. The consternation which it excited is yet as fresh in their minds as if it had been an occurrence of but yesterday—although the generation that witnessed its horrors has almost passed away. The moment one of them was seized with it was the signal for abandoning him to his fate. Brothers deserted their brothers, husbands their wives, wives their husbands, children their parents, and parents their children; and, in some of the caves on the coast, heaps of decayed bones still indicate the spots where these ignorant and helpless children of nature were left to expire, not so much probably from the virulence of the disease itself as from the want of sustenance.

This fatal instance of the inveteracy of this disorder, when once introduced into the colony, has not been without its counterpoising benefit. It has induced the local government to adopt proper precautions for avoiding the propagation of a similar contagion among the colonists. The vaccine matter was introduced with this view many years back; but as all the children of the colony were immediately inoculated, it was again lost from the want of a sufficient number of subjects to keep up a supply of fresh virus; and for many years afterwards every effort that was made for its re-introduction proved abortive. The colonists, however, are again in possession of this inestimable blessing; and, as the number of births now in the colony is very considerable, there can be no doubt that the medical practitioners there will take proper precautions to prevent them from being again deprived of it.”

From these various references and descriptions, there seems no reason to doubt that this epidemic amongst the natives was really the small-pox. From its prevalence round Sydney so soon after the formation of the settlement there, it might be argued that some unnoticed or abortive cases had been introduced into the Colony either amongst the British ships or by La Perouse’s crew, and that in this way infection had been conveyed to the natives amongst whom it rapidly spread. Though the disease would appear to have soon died out in the environs of Sydney, it would seem that an epidemic extended

* *A Statistical Account of the British Settlements in Australasia*, 3rd edition, 1824, Vol. I., pp. 300–312.

amongst the natives throughout a vast extent of country about this time. From this wide extent and outbreaks referred to later, I believe the real solution lies in an introduction by Malays into Northern Australia. This will be referred to again later. We find, for instance, that in 1803, James Fleming,* one of Mr. Surveyor Grimes' expedition of exploration around Port Phillip Bay (where Melbourne now stands), mentions in his journal having seen two natives marked with the small-pox. Lieutenant Tuckey,† speaking of the same place, says also "The face of one of the natives was deeply pitted as if from the small-pox, though that disease is not known to exist in New Holland."

A good account of an outbreak of "an eruptive febrile disease" amongst the natives of New South Wales in 1830 is given by Dr. George Bennett in his *Wanderings in New South Wales* (vol. i., pp. 148, 1834). His account is for the most part taken from an official report by Dr. Mair, Assistant Surgeon of the 39th Regiment, who was appointed by the Governor to investigate the disease. I have not been able to trace a copy of this valuable report. Dr. Bennett says that about 1830, the disease appeared amongst the natives of Wellington Valley, and resembled small-pox in its principal characters. About a year later, it prevailed amongst the aborigines of the Lachlan, Burragorang, and Cox's River, and in 1832, he had seen pock-marked natives at Goulburn Plains and in other parts of the Colony. The natives called the disease "thunna, thunna," or "tunna, tunna," and they described it as being "attended by sore throat, headache, and high febrile symptoms, upon the day previous to the appearance of the eruptions; the latter were described to me as commencing in a similar manner, and passing through the same stages as is usual in small-pox, covering the face and all parts of the body, even to the soles of the feet and palms of the hands; it was also stated that adults were more covered with eruptions, and suffered more severely from the disease than children, and the aggravation of the symptoms caused much mortality among them. Among the children it often occurred that only a few scattered eruptions would appear, and the febrile symptoms also assume a very mild character. No deaths occurred in these cases."

Dr. Bennett says that, as far as information at present extended, the disease appeared not to be an introduced one. He refers to its occurrence in the early days of the Colony and says that the Wellington Valley blacks did not regard it as of foreign introduction. None of the soldiers' children stationed at this last-named place contracted the disease though the natives around were suffering from it. He did not know whether the children had been vaccinated.

Dr. Bennett summarizes Dr. Mair's report: Between 1789 and 1830 no record of the disease in natives appears. In August of that year, Mr. Brown, of Wallerawang, first saw the disease in five natives near the Castlereagh. He had heard of its occurrence among the tribes to the northward six months before. Mr. Brown did not see more cases till August, 1831, when three blacks, who had had communication with others recently arrived from the Lachlan when it was raging, developed the disease. The Wellington Valley blacks were attacked in October, 1830, and it lasted amongst them till December. According to the testimony of George Clash, a convict who had resided with the native tribes far in the interior for several years, "the disease proceeded from the north-west coast, and spared none of the tribes as far as Liverpool Plains, attacking twenty and thirty at a time, none escaping its fury." (This reference to the "north-west coast" must not be considered trustworthy, coming from the source it did, as Sir Thomas Mitchell found that George Clash, or Clarke, known as the "barber," romanced in other important particulars. North-west should perhaps read "north-east," as Clarke lived with tribes in this direction). In some cases, the natives pricked the pustules with a sharp-pointed fish-bone, then squeezing out their contents. Clash said that the natives considered it infectious and called it "boulol."

Dr. Mair is quoted as thus describing the general course of the disease:—

"For several successive days the patient feels languid, indolent, and oppressed, loses his appetite, suffers from headache, pain of chest or stomach, increased heat of skin, and other febrile symptoms. The usual duration of this incipient stage appears to have been from two to eight days. It was followed by an eruption of small red spots resembling flea-bites, which generally commenced on the face, and gradually spread more or less thickly over the head, breast, and extremities; the tongue and lips were likewise involved in the eruption, and the soles of the feet have been particularly remarked in many instances to be numerously studded with it.

When the eruption had fully developed itself, which generally occurred in 24 hours, a remission was observed to take place in the febrile symptoms, but the patient began to complain much of pain in the throat, and could only swallow liquids. The small red spots, or papulae, were converted into vesicles or pustules, in periods, varying from three to seven or eight days; the fluid contained in these vesicles or pustules is represented

* Bonwick's *Port Phillip Settlement*, p. 15.

† *Idem*, p. 25.

by some as resembling whey, by others milk, and by others to be yellowish or straw-coloured, like the thin pus of sores. It was likewise described as bloody water. When at their height they were about the size of a pea. One very intelligent lady, who had witnessed its effects in several of the blacks, informed me the eruption was very like the cow-pock. The greater number of persons who had watched its progress, and who had likewise seen the small-pox in England, pronounced it to be that disorder. Scabs formed and fell off at different periods, in different cases, according to the length of time occupied by the maturation of the vesicles or pustules; these were occasionally confluent on the nose and cheeks, and frequently left permanent marks or indentations on the skin.

Its usual duration is stated to have been from a fortnight to three weeks in cases of restoration to health; but even after the eruption had entirely subsided, and the disease might be considered over, the convalescents were unable to walk for a long time, owing to the tenderness of their feet, from which the cuticle had entirely separated. In many cases the other sequelæ of the disease were very distressing; some lost their eye-sight, others had abscesses in different parts of the body, or foul and tedious ulcers, with great debility and emaciation. Death was said to happen generally among the Lachlan and Wellington Valley blacks about the third day after the appearance of the eruption; the tongue became much swollen, and covered with livid spots, the breathing greatly oppressed, and deglutition impracticable. Secondary fever was seldom observed, and when it occurred seemed owing to cold; but the rarity of secondary fever is easily explained by the early fatality of the disease in the severe cases in which only it could have been expected. Some were said to have perished at the very onset of the malady, before there was the slightest sign of eruption."

Among the tribes to the north-west of Liverpool Plains, the disease seems to have approached more nearly to confluent small-pox, and was accompanied by salivation a day or two after the eruption had coalesced, or, as Clash described it, "water pouring from the mouth as they lay on the ground." About the tenth or twelfth day, a convulsive fit occurred, and afterwards the fluid from the mouth was bloody and more viscid.

The epidemic proved chiefly fatal to adults and old people, seldom to children. Those natives who had had it before, as evidenced by pock-marks, were practically the only ones exempt. Dr. Mair describes some cases in Europeans. He concludes his report with the following points:—

- (1.) The disease was contagious and capable of being propagated by inoculation.
- (2.) It approached more nearly in its symptoms to small-pox than to any other known disease, more especially to that type described by Staff-surgeon Marshall (quoted in Good's *Study of Medicine*, vol. iii., p. 82), as occurring in the Kandyan Provinces in 1819.
- (3.) The mortality, probably aggravated by exposure and lack of medical attendance, varied from one in three to one in five or six.
- (4.) Vaccination seemed to exert a controlling influence, as evidenced by three blacks successfully vaccinated and exposed to infection, who escaped the disease.
- (5.) One European was attacked by secondary small-pox, and a European child died with symptoms like confluent small-pox.
- (6.) In several cases blindness occurred, and many natives were left debilitated and helpless, with marks indistinguishable from the pits of small-pox.
- (7.) It was not known to attack any of the aborigines a second time.

This epidemic apparently extended far inland, for Sir T. L. Mitchell* encountered pock-marked natives on the Darling in 1835. On 28th May, at Fort Bourke, he says that most of the men were "marked as with small-pox, only that the marks were not larger than pin heads." Another group of aborigines met with on 23rd June, he says were "almost all marked with the small-pox." Finally, in summing up the characteristics of the natives of this part, he states that "the population of the Darling seemed to have been much reduced by small-pox or other cutaneous disease which must have been very virulent, considering their dirty mode of living, and this is indeed apparent on those who survived, on whom the marks I saw were all of the confluent kind."

It would seem that this epidemic stretched further afield still, and reached as far as the Coorong, in South Australia, and the neighbourhood of Adelaide. Thus Mr. A. Molineaux† says that "in the early part of 1839, when he arrived here (*i.e.*, Adelaide), many of the natives were much pitted with marks, which they ascribed to a visitation just previous to the advent of the white man on these shores." Taplin,‡ writing in the

* *Three Expeditions into the Interior of East Australia*, Vol. I., pp. 216, 238, 304.

† *Transactions and Proceedings, Royal Society South Australia*, Vol. V., p. 110.

‡ *The Native Tribes of South Australia* pp. 44, 81.

seventies (this edition of his paper is dated 1878), refers evidently to this epidemic, but estimates its occurrence as being about the year 1818. He is speaking of the tribes that inhabit the shores of Lakes Alexandrina and Albert, and the banks of the Lower Murray. "They have a tradition that some 60 years ago a terrible disease came down the River Murray, and carried off the natives by hundreds. This must have been small-pox, as many of the old people now have their faces pitted who suffered from the disease in childhood. The destruction of life was so great as to seriously diminish the tribes. The natives always represent that before the scourge arrived they were much more numerous. They say that so many died that they could not perform the usual funeral rites for the dead, but were compelled to bury them at once out of the way. I think that there must have been more than one visitation of this kind, judging from the age of those who are pock-marked. Along the shore of Lake Alexandrina are some large mounds of earth. One of them, at Pultowar, was opened last year, and found to contain scores of human skeletons arranged in rows. These were probably the victims of small-pox." Again, he says, "There are a great many mounds on the shore, covered with mussel shells. They are from 10 feet high to 4 feet. Captain Jack (one of the natives), says the blacks made them to bury the dead in at a time of great sickness. One of these mounds has since been opened, and found to contain a vast number of skeletons of men and women, all laid side by side."

This southern epidemic can, I think, with much likelihood be linked on to the outbreak of the disease occurring about the same time in New South Wales. We come now, however, to references to the occurrence of a disease like small-pox in central, southern, and northern Australia, dating probably some time in the sixties. This would seem undoubtedly to have been introduced, in the north at least, by the Malays. By occasional intercommunications between tribes and by means of messengers, its wide dispersal can be understood, and this explains references to it in Central Australia, around Cooper's Creek and at Fowler's Bay and Streaky Bay. If I am correct in this surmise, I think that it is highly probable that the outbreak near Sydney in 1789 was also attributable to the Malays in the north coast, and was passed on from tribe to tribe till the Sydney district was reached. Flinders (Vol. II., p. 257), who met Malay prahus in the Gulf of Carpentaria in 1803, states that inquiries showed that they had been visiting these shores only for the last twenty years. On the other hand, the Central Australian and other outbreaks may represent the last embers of the conflagration arising at Sydney, if this was introduced by Europeans. Be this as it may, the following information is of such interest as to warrant presentation in full.

Paul Foelsche,* Inspector of Police in the Northern Territory, writes thus of the small-pox amongst the natives:—

"The disease most dreaded by the natives is small-pox, for which each tribe has, of course, a different name. It makes great havoc among the tribes that get infected. The last time this disease made its appearance on this coast is, as far as I can judge and ascertain, about twenty years ago. According to the tradition of a native living at Port Darwin, named 'Mangminone,' alias Mr. Knight, about 25 years of age, he had the small-pox when a boy of about 5 years (this man is deeply pitted all over the face), and some time before the white people arrived at Escape Cliffs—the Hon. B. T. Finnis's expedition in 1864. The disease broke out in the dry season, when the natives burned the grass. Old and young were stricken down with it, and a great many died, so much so that they could not bury them all, but left the corpses lying about. Among those that recovered were several who became totally blind, and there are now four of these living in this immediate neighbourhood. The disease lasted only during the dry season from about May to November, and disappeared when the wet season set in. The Port Darwin natives call the disease 'Goobinwah,' and state it came from the Alligator River tribes and travelled westward, but how far it went I cannot ascertain: no doubt it spread a long distance inland, as pock-marked natives are found among all the inland tribes.

The tradition of the Port Essington natives of the appearance of small-pox in their tribe is very similar to that of the Port Darwin natives. Some of the Port Essington tribe who had the disease are still alive, and from information gathered from them it leaves no doubt but that the malady raged there the same time and year it was at Port Darwin. They state it was a long time ago, and a long time after the soldiers had left (December, 1849), and came one year shortly after the Malay prahus had started back for Macamar (about the end of May) and when the grass was burned, it came from the tribes to the eastward of them, and went on to the Alligator and other tribes to the west of them. Plenty of old and young (and even dogs) died, but by the time the rain came on (about October or November), the disease had disappeared. One of this tribe

* Notes on the Aborigines of North Australia, *Transactions and Proceedings and Reports, Royal Society of South Australia*, Vol V., 1882, p. 7.

informed me that very old people had told him that when they were children small-pox (called by them 'meeha-meeha') killed plenty blackfellows, and adds that by-and-bye, when he will be an old man (he is now about 50), 'meeha-meeha' come on again.

Malay prahus, about 30 in number, visit the coast eastward from Port Essington to Blue Mud Bay in the Gulf of Carpentaria every year in search of 'heeche-de-mer,' and have done so in all probability for centuries past. They arrive from Macamar the beginning of January, and leave again the end of May. During the time they are here they employ all the coast tribes trepanning for them, and they all live together; and I think there can be no doubt as to small-pox having been brought to these shores by them, and on the last occasion by a prahu that visited the Gulf, for they leave as soon as the south-east monsoon has fairly set in, and shortly after the prahu had left, the disease appeared, coming up the coast from the Gulf with the S.E. winds, as stated by the natives, it travelled through all the tribes to the westward. It is not likely that this terrible disease, 'the small-pox,' was introduced here by these trepan-fishers some hundreds of years ago, and thus spread gradually all over the continent.

The remedy the natives apply to cure small-pox is a thick milky-looking juice obtained from a leafless vine (Prof. R. Tate identified this as *Sarcostemma australe*, R.Br.), found along the shores of the mangrove flats. This juice is put on the sores, and left till it forms a scab, which is washed off so soon as it gets loose; when the sore is found to be healed the skin is white, and takes about a year to attain its natural colour. This remedy is said to be a sure cure, although some who used it lost their eyesight."

This paper called forth communications from Mrs. Richards and Mr. W. H. Tietkens, F.R.S.S.* The former wrote saying that in 1866 and the beginning of 1867 the natives of Streaky Bay and Fowler's Bay, in the Great Australian Bight, had what was supposed to be small-pox, great numbers of them dying. A few of those affected were still living, and were very much pitted, more especially an old lubra, who was quite blind. Although constantly with them, no white person was known to have taken the disease. As Mrs. Richards had mentioned that Dr. Getting had been sent to Streaky Bay to attend to the natives, Professor Tate wrote to the latter, who informed him that he had treated the disease as small-pox, to which it had a close similitude, presenting similar symptoms, but he was not prepared to deny that it was not the small-pox. The natives at Streaky Bay declared that the disease came to them from the north.

Mr. Tietkens referred to a tribe of natives he had met with in the Rawlinson Ranges (S. lat. 24° 30', E. long. 127° 42'), in central Australia visited by Ernest Giles and himself in 1873. He says "the Range, quite in the heart of the continent, was surrounded on all sides by a vast extent of uninhabited country, quite of a desert character, waterless, and covered with dense scrub of mallee and mulga, and only under the most favorable conditions could it be traversed by the natives, and until he and his companion went there it certainly had never been visited by whites. They then found a people quite isolated from the rest of the world, who wandered in small communities from place to place, who seldom camped or remained a whole day in one place, deeply marked with small-pox. Of fifteen or twenty men who visited the camp, eight were unmistakably marked with small-pox."

Samuel Gason,† a police trooper, writing of the Dieyerie tribe, located about 630 miles north of Adelaide, in the neighbourhood of Cooper's Creek, refers to small-pox having been amongst them, doubtless due to the same pandemic just described. The native name for the disease was "moora moora" (note some resemblance in sound to "meeha-meeha"), and he thus comments on it. "Unquestionably small-pox, to which the natives were subject evidently before coming in contact with Europeans, as many old men and women are pock-marked in the face and body. They state that a great number have been carried off by this disease, and I have been shown, on the top of a sandhill, 74 graves, which are said to be those of men, women, and children, carried off by this fell disorder."

Dr. E. C. Stirling,‡ speaking of the Horn expedition, says, "I saw no cases which could be said to be that of small-pox, though from previous observation I have no hesitation in affirming that this disease has existed amongst the Australian aborigines."

In a paper by the Rev. Louis Schulz,§ dealing with the natives of the upper and middle Finke River, it is stated that "the scars on the faces of some afford evidence that small-pox affected them some sixteen or eighteen years ago. They call the disease 'pania.' Some are said to have died of it."

* *Loc. cit.*, p. 112.

† *The Native Tribes of South Australia*. Edited by J. D. Woods, Adelaide, 1879, p. 283.

‡ *Intercolonial Quarterly Journal of Medicine and Surgery*, Vol. I., November, 1894, p. 218.

§ *Transactions, &c., Royal Society of South Australia*, Vol. XIV., part 2, 1891, p. 218.

APPENDIX C.

A BRIEF SKETCH OF THE HISTORY OF SMALL-POX AND VACCINATION
IN NEW SOUTH WALES.

By Frank Tidswell, M. B., Ch.M. (Syd.), D.P.H. (Camb.); Principal Assistant Medical Officer to the Government of New South Wales, Microbiologist to the Board of Health.

(Read before the Australasian Association for the Advancement of Science, Friday, 7th January, 1898.)

(Abstract.)

1. SMALL-POX.

The exact time of the first appearance of small-pox in Australia has generally been referred to too late a date, mainly on the authority of Hirsch. In his *Geographical and Historical Pathology*, New Syd. Soc. Trans., London, 1885, vol. 1, p. 133, this writer states that small-pox did not appear in Australia till the year 1838, that its occurrence then was of brief duration, and that no further outbreak occurred until 1868.

Davidson (*Geographical Pathology*) considers that Hirsch's statement can only have reference to the European population, since small-pox was prevalent amongst the native blacks in 1789, shortly after the first settlement of the English in Australia.

As will be seen from the following summary of the official records relating to the matter, the early history of Australia furnishes somewhat abundant evidence in support of Davidson's contention.

The colonization of New South Wales was instituted at Sydney, Port Jackson, on 26th January, 1788, by the arrival of what is known as the "First Fleet," consisting of eleven vessels, carrying about 1,000 persons. No addition was made to the inhabitants of the English settlement till the arrival of the "Second Fleet," in 1790.

In the meantime, in April, 1789, the native blacks in the neighbourhood of Sydney were found to be dying in large numbers; their bodies were discovered on the rocks and beaches of the harbour and elsewhere. The cause of this great mortality remained unknown until a sick family was brought into the settlement, when the disorder was pronounced to be small-pox. Two elderly men, a boy, and a girl, comprised the family brought in. They were all affected with the disease. The two men died; the children recovered. A young male native, previously captured, caught the disease from his countrymen, and died from it. One other person, a sailor (negro or North American Indian) also succumbed to the disease. None of the whites became infected, although there were many unvaccinated persons amongst them.

The blacks fled from the vicinity of Sydney, but apparently carried the disease with them. At later dates exploring parties from the settlement found groups of skeletons in various directions. Many writers have testified that the blacks met with by them in various parts of the continent were pitted with small-pox. Such pock-marked blacks were observed at Perth, at the time of the first settlement there (1829), and later at other places on the western and northern coasts; in the south at Port Phillip, on the Lower Murray at Swan Hill (1838), on the Goulburn River (1841), in the north at Raffles Bay (1828), &c.

In his *History of Leprosy in Australia*, recently published by the National Leprosy Fund Committee, Dr. J. Ashburton Thompson refers to an observation made in 1828. Quoting from *A Narrative of a Voyage Round the World*, by T. B. Wilson, M.D., London, 1829, who was wrecked at Cape York in 1828, and reached Raffles Bay soon after, Dr. Thompson writes as follows:—"The only sentence in which diseases of the aborigines were mentioned by Dr. Wilson, spoke of a party who were all suffering from bronchitis, of ophthalmia, and of "deep, circular impressions, especially on the face," as though they had had small-pox, which, after some inquiry he concluded was the disease to which they were due, and the more, that one native had lost an eye during the illness which had caused them." In this we have a particularly independent observation of the early occurrence of small-pox amongst the blacks.

At the first census of the blacks of Victoria in 1877, five old persons were found pitted with small-pox. One of these furnished the information that the disease first came to his tribe down the Murray (*i.e.*, from the direction of Sydney), many years before they had seen or heard of the whites. Actual cases of the disease amongst the blacks were reported at Bathurst, New South Wales, 1830-1831 (where three white children became infected, and one died); in the neighbourhood of Adelaide, South Australia, at about the same time; and at Echuca, Victoria, between 1841 and 1845.

The inference which has been drawn from this *résumé* of the early records, is that an epidemic, starting from Sydney in 1789, spread during the succeeding years over the

whole of the continent; that it was maintained till 1845, shortly after which it appears to have died out. There is abundant evidence that during its prevalence it produced an enormous mortality amongst the blacks, about one half of the native inhabitants of the southern part of Australia having been killed by it. Notwithstanding this great loss of life amongst the blacks, the whites escaped. From first to last, probably not more than half-a-dozen white persons acquired the disease.

This fact has led to some doubt as to the disease having been small-pox, but it does not seem to merit such import being attached to it. A similar almost exclusive incidence on a native race has been observed in other countries, and with other diseases. It is not difficult to suppose that the whites took the utmost care to avoid infection from a disease, the contagiousness of which they were well aware of. It is probable that the "race tolerance" of the whites against small-pox played its part in protecting them, and, as will be seen later, vaccination began to be practised early in 1804. Every medical man who saw the disease, or the scars left by it, pronounced it to be small-pox. No disease peculiar to the blacks has been discovered which could produce such effects, and vaccination was said to be specific against it. In view of all these circumstances, there does not appear to be any satisfactory foundation for the doubts which have been expressed; but, on the contrary, all available evidence tends to prove that the disease was really variola.

There is no evidence of any previous existence of the small-pox in Australia. The evidence of the epidemic given above indicates that it started from Sydney in 1789. The records referring to it state that there had never been small-pox in the English settlement. Efforts to discover its source, made at the time of its first appearance, failed to determine whether the blacks had had any previous knowledge of it; it was found that they had a name for the disease (*gal-gal-la*), and this was supposed to indicate a pre-acquaintance with it; but exactly what *gal-gal-la* means is uncertain. It is only a local name, since in other parts of the continent the blacks referred to small-pox as *ouie* or *boie*, *parrer parrer*, *meen waranna*, &c. The absence of a root relation between such terms indicates that, at least, the disease appeared amongst them at a comparatively late period—long after the separation of the various tribes. There is thus evidence that the disease was imported by some other race. The initial incidence on the southern part of the continent negatives the idea of importation by Malays or Chinese such as, it is believed, occurred in a subsequent epidemic. The earliest Spanish, Dutch, and English navigators who touched the coast of Australia, were, probably, not in such communication with the blacks as would have sufficed to introduce the disease. The earliest accounts we have of the blacks are those of Dampier (1699) and Captain Cook (1770). Dampier makes no mention of any disease resembling small-pox amongst the blacks, although those he saw were in a neighbourhood (Sharks Bay, Western Australia) in which small-pox was afterwards common. In Cook's account of the blacks at Botany Bay and the Endeavour River, it is noted that there was no skin disease amongst them. Mr. Curr remarks that several independent traditions of the blacks, "which there can be no doubt are genuine," refer to the original source of the disease to the direction of Sydney. The devastation which the epidemic of 1789 produced indicates that it was incident on a virgin population, and one to whom it was an entirely new experience. These considerations seem sufficient to warrant the assumption that the epidemic above described marked the introduction of small-pox into Australia.

The exact source of the epidemic is involved in obscurity. It has already been mentioned that there had been no small-pox in the English settlement before the blacks became affected. An opinion very generally expressed at the time was that the disease was derived from two French ships, under the command of Comte de la Perouse, which remained for about two months at Botany Bay, at the time of the foundation of the colony (January to March, 1788); but there is no reason to believe that small-pox existed amongst the crews of these vessels; moreover, the epidemic did not appear till fifteen months after they had sailed away. There are certain circumstances connected with the medical history of the "First Fleet" which arouse suspicion that responsibility of the introduction attached to it. It was said that, before leaving Plymouth, the ship's company of the *Alexandria* transport, had "got a malignant disease amongst them of a most dangerous kind." Dr. John White, the surgeon-general of the First Fleet, did not agree with this opinion. The name of the malignant disease was not stated, nor were the deaths that occurred during the voyage particularized. Captain Trench, referring to the voyage of the First Fleet, says:—"No person amongst us had been affected with the disorder (small-pox) since leaving the Cape of Good Hope"; a statement which induces the inference that there was small-pox on board before that time. It is possible, therefore, that the *Alexandria*, or some other vessel of the First Fleet, carried the infection to Sydney, and from the settlement there it was subsequently conveyed to the blacks, perhaps by means of infected clothing or some other article, as in the case

of the North American Indians. However, it must be admitted that there is little more than surmise to go upon, and that the precise way in which small-pox was introduced into Australia remains undetermined.

Such, in brief, is the history of what appears to be the first appearance of small-pox in Australia. The disease was mainly incident on that part of the continent south of the tropic of Capricorn. There seems to have been a second epidemic amongst the blacks in 1860-61, this time apparently limited to Northern Australia. The blacks suffered severely, but the whites escaped as before. On this occasion the disease is believed to have been introduced by Malays or Chinese fishermen.

About this time the colonies of Victoria and Queensland were separated off from what is now New South Wales. As regards this latter province, the importation of small-pox has threatened, or actually occurred, on several occasions, and formed the subject of Board of Health reports in 1881-1882, 1883-1884, 1886 (*s.s. Oceanien*), 1887 (*s.s. Preussen*), 1892 (*R.M.S. Oroqui*). The most important of these invasions was the epidemic of 1881-1882, which lasted from May, 1881, to February, 1882, during which time 154 persons were attacked, and 40 died. One result of this epidemic was the passing of the Infectious Disease Supervision Act of 1881, which requires immediate notification of "any case of small-pox or any eruptive fever which may reasonably supposed to be small-pox." A Board of Health was constituted by the Act, and directed to carry out its provisions, as well as those of the Quarantine Act of 1832. Both of the Acts, amended in certain particulars, are still in force, and the Board continues to discharge its duties under them.

The system of maritime quarantine practised in this country is generally well-known. The exact details of the procedure will be found in the report of the Australian Sanitary Conference of 1884, and in the Board of Health's reports concerning the quarantine of particular vessels.

II. VACCINATION.

It is a deplorable fact that this system of quarantine has led to neglect of vaccination.

The surgeons of the First Fleet are said to have brought out "variulous matter" with them. Exactly what is meant by "variulous" matter is not clear, but in any case there is no record of their ever having made use of it.

On the 4th of May, 1803, Captain Phillip Gidley King, R.N., the Governor of New South Wales, addressed a letter to Lord Hobart, Secretary of State, suggesting that "vaccine matter" should be sent to the colony. In this letter he states that "every search has been made on the teats of our cows (for cow-pox) but nothing of the kind can be found." In response to the Governor's letter, a supply of vaccine lymph, obtained from the Royal Jennerian Society, was despatched in the *Coromandell* transport, which arrived in Sydney on 7th May, 1804. By the same vessel, there also arrived a second packet of lymph, forwarded to Assistant Surgeon Savage, by Mr. John King, Member of the Medical Council, which was "put up in a different way from that sent by the Royal Jennerian Society."

On receipt of the lymph, the principal surgeon (Dr. Thomas Jamieson) immediately vaccinated three children at the Orphan Asylum; several of the soldiers' children were vaccinated by Mr. John Harris, surgeon of the New South Wales Corps; and some other persons by Mr. Savage.

Their efforts were successful, for a notice which appeared on 3rd June, 1804, stated that "the cow-pox is now fully established in the Colony," and invited parents to have their children vaccinated. This invitation appears to have been generally accepted, since Governor King, on sending some "vaccine matter" to Norfolk Island, in July, 1804, wrote—(vaccination) "succeeded so well here that most part of the children in the Colony have received the inoculation."

After this, vaccine lymph appears to have died out and been re-introduced at intervals, the supplies coming from England, in one instance at least, from Norfolk Island.

More recently, the Colony has had a constant though small supply, derived from England until 1881, and since that time from Victoria and New Zealand, both of which colonies have established vaccine stations. No lymph is cultivated in New South Wales, though the necessity for it has been frequently urged, and the disastrous effects of such unpreparedness, which may be expected should an epidemic occur, have been pointed out time after time.

New South Wales also occupies the unenviable position of being the only province of the Australian group in which an enactment for compulsory vaccination does not

exist, although strong representations in favour of such legislation have not been wanting. The colony thus constitutes a danger and a menace to the other colonies, of which the latter have just cause to complain.

The subjoined table shows the number of persons vaccinated by the Government Medical Officers since 1861, together with the number of births, and the proportion of vaccinations to births. It does not include vaccinations performed by private medical practitioners, of which no record is kept; but these are believed to be too few to materially influence the percentages given in the table:—

RETURN showing the number of Births during the past 36 years, and the number of Vaccinations performed by Government Vaccinators during the same period:—

Year.	Births.	Vaccinations.	Proportion of Vaccinations to every 100 Births Registered.	Year.	Births.	Vaccinations.	Proportion of Vaccinations to every 100 Births Registered.
1861 ..	14,681	2,349	16.00	1880 ..	28,162	5,029	17.85
1862 ..	15,434	3,155	20.44	1881 ..	28,993	61,239	211.21
1863 ..	15,679	12,970	82.72	1882 ..	28,702	2,188	7.36
1864 ..	16,881	10,696	63.36	1883 ..	31,281	882	2.81
1865 ..	17,283	8,367	48.41	1884 ..	38,946	7,055	20.75
1866 ..	16,950	7,606	44.87	1885 ..	35,043	2,230	6.36
1867 ..	18,317	6,931	37.83	1886 ..	36,284	1,763	4.85
1868 ..	18,485	11,237	60.79	1887 ..	37,236	3,230	8.67
1869 ..	19,243	21,507	111.76	1888 ..	38,525	2,186	5.67
1870 ..	19,648	7,084	36.54	1889 ..	37,295	2,404	6.45
1871 ..	20,143	6,482	32.16	1890 ..	38,060	2,197	5.64
1872 ..	20,250	17,565	86.74	1891 ..	39,458	1,567	3.97
1873 ..	21,444	3,152	14.69	1892 ..	40,041	4,014	10.02
1874 ..	22,178	4,892	21.78	1893 ..	40,343	2,547	6.31
1875 ..	22,528	3,111	13.80	1894 ..	38,952	1,957	5.02
1876 ..	22,298	4,361	18.71	1895 ..	38,715	2,437	6.29
1877 ..	23,851	16,881	70.77	1896 ..	36,613	945	3.59
1878 ..	23,328	3,512	13.86				
1879 ..	26,933	5,569	20.67	Total ..	988,102	258,821	26.19

This Table tells a dismal story of constantly increasing apathy towards vaccination. In succeeding years the proportion of vaccinations to births has become less and less, until at the present time we are practically an unvaccinated community. Here and there sudden temporary increases in the proportion show when the importation of the disease threatened, as at such times the number of persons submitting themselves for vaccination largely increased.

This singular apathy is to be attributed to three chief causes: First, there is the suspicion which still remains that vaccination is accompanied by the inoculation of various diseases (syphilis, leprosy, and the like)—a suspicion which no amount of proof to the contrary seems able to remove from ignorant minds. Secondly, there is the fact that on the one or two occasions when small-pox actually gained an entrance, it failed to spread to any extent, in spite of the number of unvaccinated persons. The limitation of the disease in these cases was due partly, no doubt, to the energetic measures which were taken to check its extension, but it is believed that it was not entirely due to these. There was some other fortunate, but unknown, condition which opposed a barrier to the progress of the epidemic. However this be, these circumstances afford no guarantee against future invasion. The history of the epidemic amongst the blacks shows that there is no climatic influence operating in our favour, and in view of what has happened amongst civilized nations we cannot rely on our social conditions alone to protect us. Thirdly, and most important of the three, there is the misguided reliance which is placed on our system of maritime quarantine. Although it is admitted that this system has many obvious advantages favouring its practice in this country, the folly of depending on it for more protection than it can possibly afford has been remarked upon by successive chiefs of the Health Department. Moreover, its advantages are considerably diminished by the lack of uniformity in the quarantine measures of the different Colonies. A system of Federal Quarantine has been suggested, but has not found any practical application. That small-pox will some day or other effect an entry in spite of the utmost watchfulness, is the firm belief of all those who have interested themselves in the subject.

The above sketch will show the position of New South Wales as regards vaccination—Too far removed from the countries of the old world to be impressed by their experiences of small-pox, and lacking the salutary effect (as regards vaccination), of previous serious contact with the disease, the people of this Colony remain to-day unwise as to their own interests, and indifferent towards those of their neighbours.

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Reports of the New South Wales Board of Health.

APPENDIX D.

EXTRACTS FROM A SERIES OF ARTICLES BY DR. G. L. MULLINS, IN THE
AUSTRALASIAN MEDICAL GAZETTE, 1896, 1897, 1898.

In the year 1803 the Royal Jennerian Society, which had just been established in England, forwarded to the Governor of New South Wales a "Pacquet of the Vaccine Matter for Inoculation." This supply of lymph arrived in Sydney by the transport *Coromandel* on Monday, 7th May, 1804. By the same vessel there also arrived a small quantity, which had been forwarded by Mr. John Ring, member of the Medical Council, to Mr. Savage, the Assistant Colonial Surgeon. This latter was said to have been "put up in a different manner to that sent by the Royal Jennerian Society." Immediately on its receipt the Governor (Captain P. G. King, R.N.) directed the principal surgeon, Mr. Thomas Jamison, to make instant use of it on three orphan children. Mr. Harris, surgeon of the New South Wales Corps, also vaccinated several children belonging to the military, and Mr. Savage performed the operation on a number of other children. I am unable to state positively the exact day on which the first vaccination was performed, but it was certainly between the 8th and 12th of May, 1804. To Messrs. Jamison, Savage, and Harris belongs the honour of performing the first vaccinations in Australia. Mr. Harris' experiments did not meet with the desired success, so that gentleman repeated the trial on four others, "in a manner not before tried," on Thursday, 17th May, 1804, and this time with the happiest effect. Messrs. Jamison and Savage were probably rewarded for their efforts, for on 3rd June the following notice appeared in the *Sydney Gazette* :—

NOTICE.

"As the cow-pox is now fully established in the colony, it is hoped no parent or guardian of any children will omit availing themselves of so great a blessing, which, as has been shown in the *Gazette* of the 13th of May last, is an infallible preventive against that generally fatal distemper, the small-pox."

The account referred to (of 13th May) was an elaborate table of statistics published by the Royal Jennerian Society, showing, the efficacy of vaccination.

In the issue of 3rd June, there also appeared the following under the heading of "General Orders" :—

"Such children as the parents or guardians may wish to have inoculated are to attend at Parramatta on Tuesday and Wednesday next, after which a permanent attendance will be directed at Sydney, Parramatta, and Hawkesbury."

On 24th June a further notice appeared :—" All parents who wish their children to be inoculated with the cow-pox are desired to attend the Principal Surgeon at the General Hospital on Saturday next with their children ; and after that day they are to attend every Wednesday and Saturday from 8 to 10 o'clock in the morning, during which hours regular attendance will be given to all descriptions of persons desirous of availing themselves of so great a blessing as that which now offers in the happy introduction of the vaccine virus."

On 14th October, 1804, Mr. Thomas Jamison, the principal surgeon, published a paper entitled "General Observations on the Small-pox," in the *Sydney Gazette*. In this interesting communication the author states that it was "generally accredited by the medical gentlemen of the colony on its first establishment that the small-pox had been introduced among the natives by the crews of the French ships then lying in Botany Bay ; but since that period no vestige of that disease has ever appeared." He concludes his paper as follows :—" I shall only remark that the preventive qualities of the cow-pox are incontrovertibly established ; no preparatory regimen or extraordinary care are requisite in its application or progress ; it is attended by no sort of danger or external blemish ; wherefore, should parents delay to embrace the salutary benefit now tendered gratuitously, and the vaccine infection be lost, the most distressing reprehensibility may accrue to them from their remissness in the preservation of their offspring, whose destruction hereafter may be reasonably apprehended to ensue from the small-pox, should it ever visit this colony in a natural state." This article has a further interest in the fact that it is the first medical paper ever published in Australia.

In this paper I have dealt only with the first epidemic of small-pox and the original introduction of vaccine lymph into our continent. In a further paper I shall continue the history of small-pox and vaccination down to the present day.

MR. THOMAS JAMISON'S WORK, 1804-1809.

It is quite evident that, owing to the exertions of the medical men in charge of the settlement, a large number of children were vaccinated within the first half of the year 1804. On Sunday, 1st July, 1804, the *Sydney Gazette* contained the following paragraph :—

"On Monday a number of children were inoculated for the vaccine pox by J. Harris, Esq., Surgeon to the New South Wales Corps : and the operation was on Saturday performed on many others by Thomas Jamison, Esq., Principal Surgeon : and no doubt can be entertained that every parent desirous of preserving their children from that most dreadful scourge to humanity, the small-pox, and of promoting its extermination will readily embrace the present favourable opportunities."

On Sunday, 14th October, 1804, the *Sydney Gazette* published Mr. Jamison's paper, "General Observations on the Small-pox," to which I have already alluded. As this paper is of considerable historical and scientific interest, I reproduce it here in full :—

"An erroneous opinion, in relation to the small-pox, being generally received, and as an inference deduced therefrom equally fallacious with the principle upon which it is founded, I conceive it a duty incumbent on me as principal surgeon of this Colony, to remove prepossessions which, if adhered to, must be productive of the most calamitous consequences to the rising generation of these Colonies.

First, it is conceived by a number of parents and others having the care of children that they have had the small-pox in a natural way, and secondly, that little danger is to be apprehended from its effects in this climate. In refutation of a conjecture fatal to be indulged I must observe the disease by some considered as the small-pox is no other than an eruptive appearance on the skin, proceeding from climate and other constitutional causes ; others may be deceived by the chicken-pox—an error that may be readily imbibed by those who are not conversant in the natural small-pox ; for I most positively affirm on my own personal knowledge for ten years past that not a single instance of the latter disease has occurred in this country.

It is generally accredited by the medical gentlemen of the colony on its first establishment that the small-pox had been introduced among the natives by the crews of the French ships then lying in Botany Bay ; but since that period no vestige of that disease has ever appeared.

In contradiction to so ridiculous an idea that the natural small-pox should not carry with it, and be productive of effects baneful and destructive in the extreme, I have here to observe that at the Cape of Good Hope (the latitude being nearly the same as this place) the inhabitants dread the appearance of the small-pox, as in other countries they do a plague, from the fatal malignity of its tendency and effects ; and I have no doubt that should the disease ever visit this colony in a natural state, and particularly in the Summer season, it would carry off nine-tenths of those who might receive the infection.

From the foregoing facts and circumstances I would earnestly recommend parents to avail themselves of the blessing held out to them by the provident care of the parent

Country, by having their children inoculated with the vaccine matter or cow-pock—an infallible preventative of that loathsome, disgusting, and too-often fatal disease, when taken in the natural way.

It is almost needless to remark further on the particular virtues and properties of a discovery, announced and recommended to public notice, for the general benefit, from such high and indisputable authorities; I shall only remark that the preventative qualities of the cow-pock are incontrovertibly established: no preparatory regimen or extraordinary care are requisite in its application or progress: it is attended by no sort of danger or external blemish, wherefore should parents delay to embrace the salutary benefit now tendered gratuitously, and the vaccine infection be lost, the most distressing reprehensibility may accrue to them from their remissness in the preservation of their offspring whose destruction hereafter may be reasonably apprehended to ensue from the small-pox, should it ever visit this colony in a natural state."

The *Sydney Gazette* in referring to this paper, said:—

"There was every reason to hope, that upon the happy introduction into the Colony of the vaccine virus, every parent would have availed themselves of so inestimable a blessing without the necessity of repeated solicitation. The several medical gentlemen have sedulously adopted the conduct of the British Faculty, whose benignant labours extending over the whole surface of the globe, reflect eternal honour to the country which to the discovery gave birth and although in numerous inoculations that have been made the innocence of the operation has incontestably proved itself, yet indolence or thoughtlessness prevents many from taking advantage of the opportunities that have long offered, and even still continue. If any specious or any plausible argument can be set up against the necessity of vaccination, they must give way to the unanswerable of the Surgeon-General of this Colony, contained in the preceding page: and any objection to so innocent an operation in which the very existence of our children is deeply interested must hereafter be considered as a flimsy absurdity, only started with a view to saving trouble. Parents are by that gentleman again exhorted to attend to this material point of duty, and possibly many who regretted having delayed the object until it was now thought too late, will recover from the inconsolable reflection, and promptly prevent the possibility of a funeral pang."

The supply of vaccine lymph appears to have become exhausted soon after this, for there is no mention of any further vaccination until 8th December, 1805, when it was announced in the *Sydney Gazette* that "Mr. McMillan, Acting Surgeon of His Majesty's ship *Buffalo*, procured some of the vaccine matter of Mr. Wentworth, Surgeon at Norfolk Island, and having bestowed every care and attention in inoculating several children and others on the passage from thence to Hobart Town, he had the satisfaction to be assured before he left that settlement of his having fully succeeded in communicating so inestimable a blessing; and as Mr. McMillan has been so fortunate as to succeed in bringing the virus here, it is hoped an attention to Mr. Jamison's advertisement will secure a continuance of its benefits to these settlements."

The advertisement referred to, which appeared in the *Gazette* on 8th and 15th December, was as follows:—

"Inoculation for the Cow-pox.—Thos. Jamison, Esq., Principal Surgeon, desirous of promoting the benevolent design of vaccination throughout the Colony, requests that settlers and other distant inhabitants who have children that have not yet received the benefit, will forward a list to him at Sydney, specifying with their names and places of abode the number of children for inoculation, in order that convenient places of attendance may be chosen in each neighbourhood, and a time for performing the operation appointed, of which timely information will be given in the *Gazette*."

Apparently this did not produce the desired effect, for Mr. Jamison published an appeal to the public on 19th January, 1806—

"I finally address the parents of children in this Colony on a subject which is of much more importance than they seem to conceive it. It is an object of the first importance, as it has no less in view than the preservation of the lives of the rising generation of this Colony. In adopting the measures held out of inoculating their children with the cow-pock, in order to prevent the fatality which must attend their having the natural small-pox; it being ascertained beyond a doubt that the inoculation with the vaccine virus is an effectual preventative against that dreadful and loathsome malady; I conceive it ought to be one of the most serious considerations that can well occupy the mind of a tender parent, who has the well-being of his infant offspring at heart, and wishes to discharge that Christian duty that is incumbent on them, in adopting every measure to preserve their health and prolong their days. Let me again impress on your minds the serious tendency of neglecting so favourable an opportunity as I have formerly tendered you my services gratuitously, notwithstanding, parents have been so remiss in coming forward with their children that I now consider it necessary to inform them that

the vaccine virus must be inevitably lost if they do not permit their children to be inoculated. If they do not embrace the present opportunity they may repent hereafter when too late, of the great injustice they have done to their children. Should ever the natural small-pox break out in this Colony, I fear few who are seized with that disease will escape with their lives, and I can take it on myself to assure the inhabitants of this settlement that the vaccine inoculation has been attended with the greatest success ; out of 1,000 and upwards who have been inoculated in this Colony with cow-pock, I can affirm that not one has died, nor has it left behind the smallest blemish. I again beg parents to turn this circumstance over in their minds, and give it due consideration, which I trust will operate so forcibly as to induce them to adopt a measure so truly beneficial to their infant families in protecting them from the baneful effects of a disease, which in its natural state and tendency has frequently been little more in mortality to the plague itself. Should all the evils I have pointed out occur one day or other I trust the public will allow that no reprehensibility can attach to me, as I have used every persuasion and exertion in my power to carry such a laudable system into effect, as far as my ability extends. If frustrated by those designed to benefit thereby, I can only lament their obstinacy, and express my sorrow for the injury done their infant families."

Signed "T. JAMISON."

It would appear from this that in one year and eight months over 1,000 vaccinations were performed in the Colony. The total population of the settlement in September, 1805 was 6,954 ; therefore over one-seventh of the inhabitants had been vaccinated, and this happy result was undoubtedly due to Jamison's exertions. Would that he were a Government Vaccinator in a populous district at the present time.

Mr. Jamieson left Sydney for England by the ship *Admiral Gambier* on 29th March, 1809.

MR. REDFERN'S REPORT, 1809.

Mr. W. Redfern, a medical man, was apparently the next to interest himself in this subject. Mr. Redfern, on 16th October, 1809, sent the following communication to the Lieutenant-Governor, Colonel William Patterson :—

"Sir,—It is with extreme pleasure I at length feel myself enabled to state, with a degree of certainty, that my endeavours to establish the vaccine inoculation with the virus I had the honour of receiving from you, have perfectly succeeded. The re-introduction of so great a blessing to the rising generation, as an infallible, safe, and mild preventative of one of the most fatal diseases to which the human species is liable—the small-pox—and which, fortunately for the inhabitants of this Colony, has not yet made its appearance among them, will, I am confident, afford the most heartfelt satisfaction and highest gratification to your benevolent and philanthropic mind.

That this communication was not made at an earlier period, I trust you, sir, will not impute to negligence or disinclination, as it was with the utmost pain and difficulty I was able to carry on my experiments, from a very severe inflammation in my right hand, which commenced the very day after I had received the virus, and totally incapacitated me from writing ; and, indeed, I was also unwilling to hazard a report of its success until I had established it beyond the possibility of doubt, which, I am happy to say, is now the case.

I have enclosed, sir, for your information a list of those who have been vaccinated, with the success attending it.

It now remains, sir, for such measures to be adopted as your wisdom may suggest, that may appear best calculated to carry your benevolent intentions into effect, in order to diffuse it as generally as possible. From those in the superior ranks of life, we may, I presume, calculate upon every support that example and precept can furnish ; but it becomes highly necessary to impress on the minds of the poorer orders of people, whose ignorance renders them but too susceptible of the grossest and most unfounded prejudices, the usefulness, safety, and superior advantages of this new plan of inoculation. At the same time, I hope it will be managed with such judgment and discretion as will tend to keep it constantly alive ; for there will always be considerable risque of the virus becoming effete from the length of time that must necessarily elapse in conveying it either from Europe or India. This object can only, in my humble opinion, be obtained by inoculating but a few at a time.

I remain, Sir,

With the greatest respect,

Your Honour's most obedient servant,

W. REDFERN."

Mr. Redfern, who was evidently an enthusiast, appears to have received considerable encouragement in his good work, for the *Sydney Gazette* contained the following paragraph on 29th October, 1809 :—

“ Mr. Redfern has already made considerable progress in the vaccine inoculation, having performed the operation upon a number of young persons in Sydney. Its success in for ever after preventing the small-pox from taking place is universally established. No pain attends the operation; no danger, and no possibility of future blemish. What, then, would be the sensation of a parent, whose obstinacy had exempted their children from so great a blessing, should that most dreadful of all human scourges, the small-pox, unhappily here be introduced, and the vaccine inoculation at the time extinct! It is the design of Mr. Redfern to visit the different settlements alternately, and thus to extend its benefits throughout the Colony. His exertions are liberally patronized, and it is sincerely to be hoped will meet with no impediment, as humanity, and more immediately the preservation of our children, is its great and only object.”

Mr. Redfern acted for some time as Assistant Surgeon on the Civil Medical Establishment of the Colony.

From the year 1809 until 1830, I find very few references either to small-pox or vaccination in the Colony. It would appear from the literature of the period, however, that the colonial surgeons succeeded to a marked degree in inducing the people to submit themselves and their children for vaccination. Wentworth tells us that after many failures to re-introduce the vaccine lymph, success at last crowned their efforts. “ Through the indefatigable exertions of Dr. Burke, of the *Mauritius*,” he says, “ the colonists are again in possession of this inestimable blessing, and there can be no doubt that proper precaution will be taken to prevent them from again being deprived of it.”

APPENDIX E.

REPORT ON VACCINATION FROM THE MEDICAL ADVISER TO THE GOVERNMENT OF NEW SOUTH WALES FOR THE YEAR 1867.

There were 37 public vaccination districts in the Colony at the end of the year 1867—20 in the country and 8 in Sydney. This partition of the metropolis into vaccinating stations is purely arbitrary. In the absence of some authorized subdivisions of this kind, I have considered it desirable to distribute the city into as many vaccinating localities as there were public vaccinators in it at the end of last year; so that the whole staff of this Government establishment is now exhibited in one view.

The returns from the several vaccinating stations in town and country display very unequal degrees of success in extending the protecting powers of vaccination; yet I am confident the officers engaged in this beneficent work discharge their duties with zeal and fidelity, as far as lies in the compass of their individual activities. There is, however, an opposing moral force against which all professional energy and all ordinary reasoning operate without effect; and it were to be wished that the existence of this force was only a simple postulate; but the reports of those who are the best qualified to decide, show clearly that the obstructive apathy or prejudices of parents are settled theses, confirmed every year by the decreasing number of vaccinations.

One gentleman writes that “ vaccination, to become general, must be compulsory. Many of the native-born who are married and have never been vaccinated, do not see any necessity in having their children vaccinated.”

I have said apathy. But whatever be the sentiment in the minds of the parents which prompts them to oppose the employment of so potent, so sure, and so innocuous a defence against the inroads of small-pox, it is only an effect. The root of the baneful prejudice luxuriates in a richer soil; where, in truth, many another moral pestilence is propagated. The legitimate cause is ignorance—primordially the ignorance of *mothers*; a truism, by the way, which, as a little reflection will show, goes far to resolve the problem of compulsory education.

Speaking parenthetically, I would ask, Whence arises that unsightly brood of moral cankers—the biassed judgments of mankind, the moody bigotries, the opiniatrics, the ineradicable prejudices, the sophistries, the selfish intolerance, the oily falsehoods winding mischievously through all the business of life? They spring from the want of knowledge; they are the exuberant growth of *maternal* ignorance; and it is such

caecodæmons of the intelligence as these, progenerating still, that become the most deadly and efficient impediments to human progress, that frustrate the full expansion and the free exercise of the young plastic intellect, and render it incompetent in the years of maturity to exert its noblest faculty—the power to discriminate between the true and the false of the things of life. Minds thus hemmed in are little qualified to correct faults in their own judgments, or to deduce sound conclusions from the propositions of the worldly ethics reduced to practice everywhere around them.

The essential object of all education is to instruct the young mind in what is true. As times go, deception mingles with and tarnishes all the pursuits of man; and it is to enable the young mind to discover the elements of truth, and separate them from what is untrue of things, that a higher order of instruction than public schools now, or at least lately, were capable of imparting. Error in the youthful processes of thought, whether resulting from absolute ignorance or from *mis*-construction left to grow up and ripen into convictions, become in the course of time habits of the mind; and, consequently, through the adapting contrivance of nature, they are transmitted, like physical blemishes, from mother to child, till at last they grow into positive idiosyncrasies of the mental constitution, reproducing in their turn corresponding intellectual obliquities, acting more or less injuriously on the issues of life.

And it is these conditions of ignorance, or a jejune culture of the mother's understanding, which stimulates the moral sentiments of all classes of society, the rich as well as the poor, to revolt—as exemplified in the question of vaccination—against some of their dearest interests. It is ignorance—not the baser impulses of the human heart—which is the true cause of that otherwise unaccountable antagonism which the uneducated mostly, but not a few of the educated also, so frequently set up against the progress of those scientific improvements whom chief tendencies are towards their own happiness and the amelioration of their own condition; and until the fogs which hang so dense and heavy over the mental vision of the benighted classes shall have been dissipated by the brightening rays of actual knowledge operating on the female mind, philanthropy may shed her tears in vain. If the daughters of the working classes were taught at public schools something more practical, deep, and lasting than a routine of flimsy coaching to exaggerate their ordinary surface-painting, and render it splendid and fascinating at examinations; if they were taught some lessons in logic, or the principles of common sense methodized, and their reasoning powers thereby expanded, and their thoughts trained to habits of order in their examination of any disputable points in the realities of life coming under their scrutiny, as well as in giving accurate expressions to them in language; if they were led on, by easy graduations, to investigate without restriction, any of the established popular theories, opinions, beliefs, prejudgments, &c., which interest, perplex, or inform the understanding; nay, if they were subjected to an elementary course of mathematics, including algebra, but without ascending to the higher abstractions of the science—and I see neither anything startling in the suggestion, nor why this might not be substituted for some of the less important or necessary branches of female study, as it would only take the place and time of Latin or Greek with boys, and would both sharpen and habituate their understandings more than anything they can learn, in the accurate discrimination of right and wrong on whatever concerned their moral or physical interests, in short, to be practical and domestic, if they were enabled by suitable instruction to reason out to first principles the *why* and the *wherefore* of all things that are likely in any way to influence the concerns of their future sphere of action in this “jumble of sighs and tears” which constitutes the volume of human life, then, and only then, would they be fitted to become both worthy mothers and indefatigable propagators of the soundest form of human knowledge to succeeding generations. These, with a general view of national philosophy, would suffice.

Maidens thus trained would find no difficulty, when they become mothers, in comprehending why gloomy prejudices and misconceptions of every name, quality, and degree of power over the affairs of the world, are inimical to social happiness, and the source of inconceivable mischiefs; and by the same light, they would learn the reasons why the salutary and protective effects of vaccination are urged so earnestly and persistently upon them, as embracing one of the most momentous interests of the human family.

There is nothing so precious in life as the proper culture of a girl's understanding, and no consideration on earth should weigh the value of a feather against the full and accurate measure of education being meted out to her, I trust, the future regenerator of the human race. It is only by instructing mothers, that the seeds of sound and useful knowledge and a pure morality can ever be disseminated and made to take permanent root. Enlighten thoroughly the maternal mind, and the husband and the children will not remain long in darkness. The reason is as obvious as the writing on the wall.

The promotion and success of vaccination concern all alike, from the peasant to the peer. It excites all our softer emotions, it pleads in burning accents to every heart and every conscience, for the young, the innocent, the tender, and the beautiful are its surest victims. It appeals, I repeat, to the affections, and especially to the common sense of every man and woman of the community, to exert their best endeavours in extending this great boon to the utmost limits both of civil and savage life.

Governments may well call for annual reports of the progress of vaccination; few interests in our social condition are more deserving of serious thought. Certainly it is not a matter of true political economy, for it ceases to be productive under the unrestricted *laissez-faire* system; on the contrary, it only thrives in the ruder embraces of legislative protection. Without compulsion for its foster-mother, it is to be feared that this best and only defence against the deforming and fatal ravages of small-pox will at last fall into ruin from excess of liberty. I respectfully submit, therefore, that this missionary of protection against a great evil ought not to be sent to hibernate from year to year on the meagre fare of an annual report, or at the expense of a few half-crowns.

Compulsory vaccination ought to be taken into consideration and treated as a necessity, like all other State obligations which bind society to particular useful courses.

FRANCIS CAMPBELL, M.D., F.A.S.L.,

Medical Adviser to the Government.

APPENDIX F.

LONDON MEDICAL GAZETTE, 1839, VOL. 24, P. 477.

SMALL-POX AT SYDNEY.

There has never been, in the memory of the oldest colonist, so long continued and so severe a visitation as that under which the island has suffered for the last month.

We regret to state that, although its virulence occasionally abates, yet relapses are constantly recurring with increased severity. We may almost say that no individual has experienced one single attack; no sooner does he consider himself convalescent, than he finds himself struck afresh by the disease with renewed vigour.

We believe we are rightly informed when we state that there is no one house in this town or its vicinity, all the inmates of which have escaped attack in a more or less degree. The whole of the inhabitants, from the oldest to the infant, have passed through it, many with unspeakable suffering of weeks' continuance, all with much pain and inconvenience. Those in the decline of life, or of exhausted or injured constitutions, have experienced longer and more virulent attacks than the young and healthy. Perhaps the best method of exhibiting the nature of the disease upon the former will be by relating what we experienced, and which was also experienced by some of our friends. The attack commenced in the usual manner:—Difficulty of breathing, particularly through the nose, a sense of fulness stopping up the passage, an acrid fluid distilling therefrom—an oppressive weight in the forehead—a distressing uneasiness in the uvula, the throat and the tonsils, attended for some days with loss of the voice—the cough increasing, producing at each paroxysm an excretion of mucus, brought up with great difficulty and exertion. As these symptoms increased, their severity was particularly felt at the approach of evening, until at last, the patient being unable to remain in the horizontal posture, was compelled to pass the nights in a chair, for the last hours of which the difficulty of breathing was attended with a sensation in the chest which can be somewhat understood by imagining a dry honeycomb to be there, through the cells of which every respiration passed, and which were destroyed and replaced with a loud crackling noise at each inhalation and exhalation.

After continuing in this state for some hours the paroxysm abates, the cough is easier, expectoration of mucus takes place, and exhausted nature sinks into a sort of convulsed repose. During the day the mental and bodily powers are so devigorated that the patient, incapable of exertion, seeks only not to be disturbed, until the night again coming, the above scenes of suffering has again to be undergone. As it would be impossible for the human constitution to stand up long against such attacks, so, after

a few nights, the paroxysms diminish in severity, until little by little the mucus becomes thicker, less in quantity, is discharged with more freedom, the wheezing crackling in the throat and head is less felt, and convalescence approaches.

The medical treatment which has been found most serviceable in this terrible disease, is simply and alone to alleviate the symptoms, for experience shows they must and will work themselves out. The constant use of thick mucilage of gum arabic, a teaspoonful of laudanum added to a 10-oz. phial when the cough is troublesome—attention to the bowels by saline aperients—if continued pain in the chest, blister.

The syrup of white poppies, taking a few drops into the throat when the cough is violent, affords considerable relief. The acetate of ammonia and the nitrate of potassa are usefully administered, as is that best of diaphoratics—the solution of tartarized antimony, in small frequently repeated doses. The free use of demulcent drinks, barley water, and, above all, the most rigid abstinence.

This course, with the most guarded caution against taking fresh cold, is perhaps as efficacious as any which can be adopted towards the removal of a disease which would appear to submit only to alleviating treatment—to subdue it promptly seeming to be quite impossible.

We have already stated that this affection is evidently atmospheric, dependent entirely upon some constituent with which the atmospheric becomes impoisoned, and until that ingredient is wholly removed by the restoration of the ordinary qualities, in their ordinary proportions, the lungs and perhaps other sources of the vital supply to the human being not being suitably furnished therewith, disease and (in the case of cholera) death too frequently follows.

V. D. L.

Sydney, 1st January, 1839.

APPENDIX G.

The following extract from *Tom Petrie's Reminiscences* (pp. 5 and 65) published in 1904 referred to small-pox amongst the aborigines of Queensland :—

“ When my father first came to North Pine, nearly forty-five years ago*, pock marks were very strong on some of the old men; they explained to him how the sickness had come amongst them long before the time of the white people, killing off numbers of their comrades. Pock marks they called ‘ nurang-nurang,’ the same name as that given to any wart. (From this, Neurum-Neurum Creek, near Cahoolture, gets its name). The scourge itself was ‘ bugaram ’ and the latter was what the instrument similar to the ‘ wobbaklan ’ was called.

There was probably some connection, in that they were both awe-inspiring in their way. The ‘ bugaram,’ which the women never saw, was no common everyday instrument, and was looked on with wonder, while small-pox was something to be spoken of in a whisper and with bated breath.”

* Approximately 1860 .



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Accession no.
5607

Author
Australia. Director
of quarantine.
The history of...

Call no.



W. R. STEINER